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ANAEMIA IN POOR CLASS WOMEN

WITH SPECIAL REFERENCE TO PREGNANCY AND MENSTRUATION

BY

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About four years ago it was decided by Professor L. S. P. Davidson of the Department of Medicine, Aberdeen University, that a large-scale investigation into the incidence, aetiology, and treatment of anaemia among the poor classes should be carried out in Aberdeen. This work has entailed estimation of the haemoglobin levels of more than 3,000 individuals of both sexes and of all ages, from infancy onwards. It is important to emphasize that the subjects included in this survey considered themselves to be in normal general health; they were not selected because anaemia was suspected. Indeed, every precaution was taken to ensure that they formed a representative cross-section of the poor classes in Aberdeen. Many of them were volunteers obtained at dispensaries for the poor and at clubs for the unemployed. In other cases—for example, at ante-natal clinics—a haemoglobin estimation formed part of the routine examination of every woman who attended. The economic status of the different groups naturally varied, but it is on the whole a fair average of the poorest classes in Aberdeen. In many families the wage-earner was unemployed. The average income for the entire group was roughly 11s. weekly per "man-value." In this communication the anaemia of adult women will be discussed with special reference to pregnancy and menstruation.

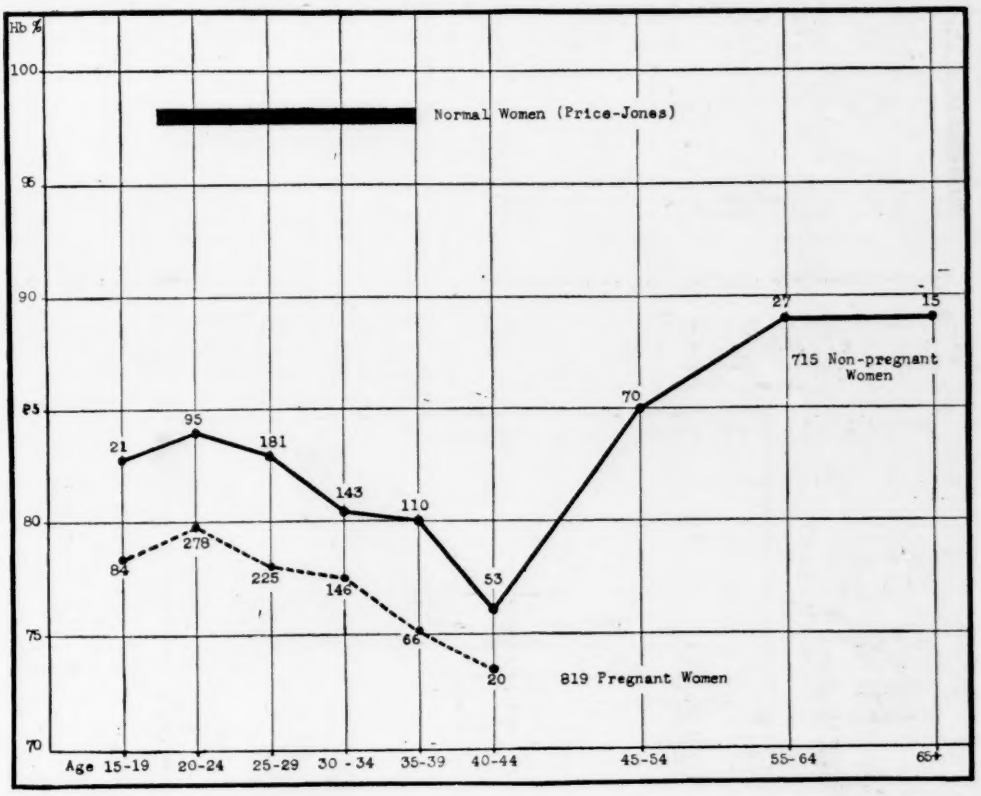

FIG. 1.

Effect of Age

In Fig. 1 the average haemoglobin levels of 1,534 women of different age groups are presented. The group of 715 non-pregnant women contained no nulliparae; the remaining 819 women were pregnant at the time of examination, and of these 40 per cent. were nulliparae. Haldane haemoglobinometers were used for all haemoglobin estimations, and their accuracy was repeatedly checked; the haemoglobin standard, therefore, is such that 100 per cent. corresponds to 13.8 grams of haemoglobin per 100 c.cm. of blood. The figures at each point on the curves in this and in subsequent charts represent the number of individuals examined.

The main conclusions drawn from these curves have already been published,[1] and may be summarized here as follows:

1. The haemoglobin percentage curve for non-pregnant women falls gradually throughout reproductive life and lies well below the normal standard for women—98 per cent., according to Price-Jones.

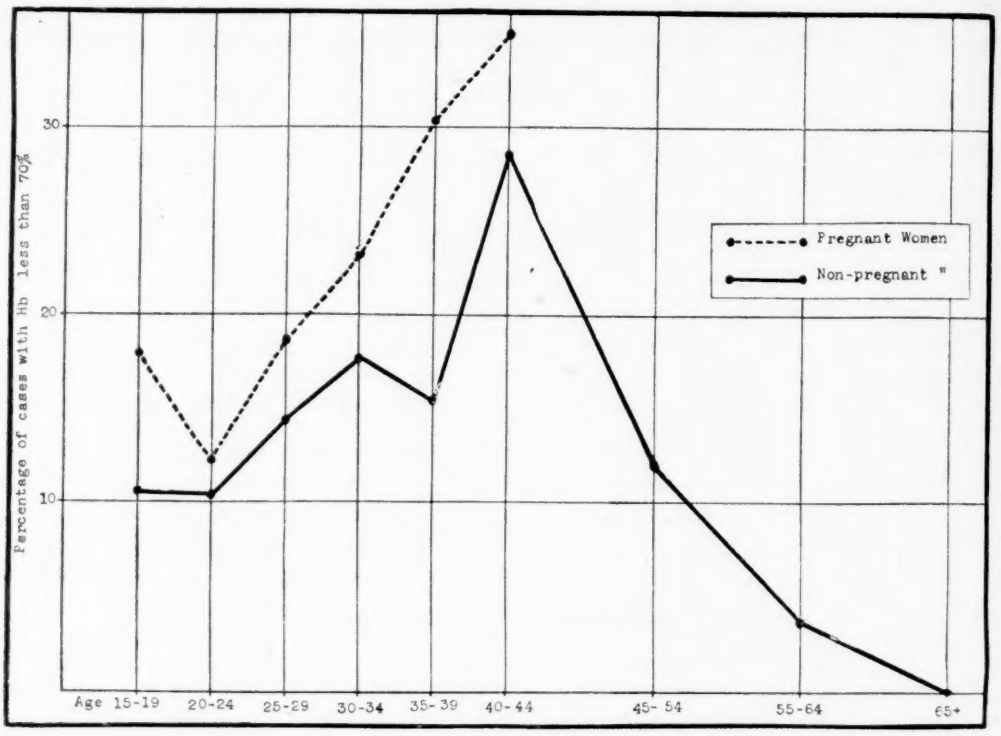

FIG. 2.

2. After the menopause there is a marked rise in the average haemoglobin level.

3. The curve for pregnant women shows a striking parallelism to that for non-pregnant women, and lies about 5 per cent. below it for all age groups.

The effect of age on the incidence of anaemia is shown graphically in Fig. 2. It is seen that the percentage of non-pregnant women with less than 70 per cent. haemoglobin increases markedly with age, rising from 10.5 per cent. for the age group 15 to 19 years to 28.6 per cent. at the menopause. Thereafter the incidence falls gradually to zero for the over 65 age group. The incidence of haemoglobin levels of less than 70 per cent. in pregnant women is greater for all age groups and shows the same rise with increase in age.

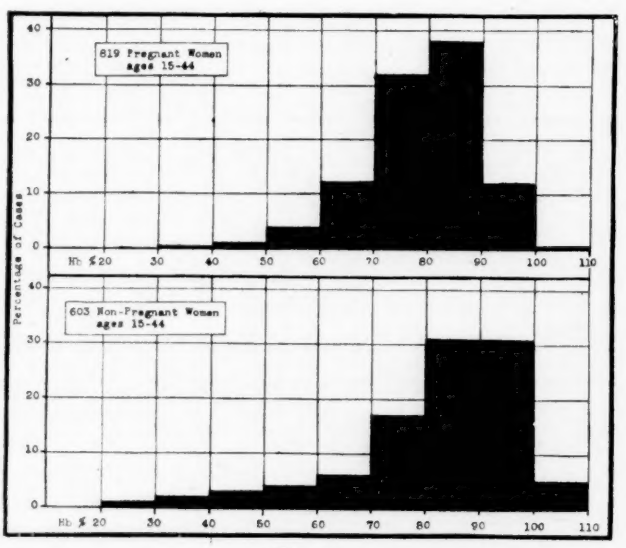

FIG. 3.

Fig. 3 shows the distribution of haemoglobin levels in pregnant and in non-pregnant women aged 15 to 44. The abscissa represents decimal ranges of haemoglobin and the ordinate the percentage of subjects whose haemoglobins fell into each decimal range. The chart for non-pregnant women shows that 30 per cent. had haemoglobins less than 80; 16 per cent. were below 70; and as many as 6 per cent. had less than half the normal haemoglobin concentration. Of pregnant women 49.5 per cent. had haemoglobin percentages of less than 80; 17.5 per cent. were below 70; but only 1.5 per cent. showed less than half the normal level. Thus there is a greater incidence of anaemia in pregnant than in non-pregnant women, but the percentage of cases of very severe anaemia (haemoglobin less than 50 per cent.) is less.

Iron Intake

Complete blood examinations and treatment by iron of several hundreds of these women have shown clearly that the anaemia is due to iron deficiency. Therefore, the majority of women of this class are presumably in negative iron balance throughout reproductive life; menstrual blood loss and repeated pregnancies apparently constitute demands which are inadequately met by the dietary intake of iron. The diet of this class of the population is strictly limited by income, consists largely of iron-poor carbohydrate foods, and is low in iron-rich foods such as animal protein and green vegetables. The calculated iron intakes of forty-nine poor families in Aberdeen have been previously reported in detail.[2] The average iron intake per day was 10.71 mg. per "man-value," and intakes of 5 and 6 mg. were not uncommon. Cathcart's[3] standards of relative food requirements were used in computing the "man-value" of each family. On this basis a woman is reckoned as 0.8 of a man. Hence the average daily intake of iron was 8.57 mg. in the case of women. In these calculations no allowance was made for waste in cooking. If the recom-

mended deduction of 10 per cent. be allowed for wastage, the daily intake of iron of poor women in this city is approximately 7.71 mg. Widdowson and McCance[4] did not make these deductions in comparing our figures with their findings in the series of women of the middle classes whom they investigated. However, direct estimations of the total and "available" iron contents of the dietaries of poor women in Aberdeen are to be carried out, and will give more definite information on this important point. A further modification of the above figures is necessary in view of the fact that the iron content of "golden syrup," which is consumed often in large quantities by the poor families in this city, was erroneously taken to be the same as that of molasses, which actually has a much higher iron content. Correction for this error reduces the average daily iron intake to 7.3 mg. for women. From published reports[4 5 6 7] of the availability of iron in foodstuffs, it appears that probably about 75 per cent. of the total iron content of the diets of poor women is "available." It can be assumed that approximately one-half of this amount may be absorbed.[8] Thus in the class of women under consideration an average of about 5 mg. of "available" iron is ingested daily and approximately 2.5 mg. of iron may be absorbed.

Thus the majority of women of the poor classes are restricted to an iron intake which is very much less than the generally accepted standard figure of 15 mg. per "man-value" given by Sherman.[9] It is interesting to observe, however, that the haemoglobin curve of women who have passed the menopause shows a marked rise (Fig. 1), indicating that, when the demands of pregnancy and menstruation have ceased, this low iron intake permits of considerable haemoglobin regeneration. This fact becomes still more striking when it is realized that absorption of iron is less efficient in older women, since the incidence of achlorhydria increases with age.[10 11 12 13 14 15]. Iron balance studies have indicated that adult males can maintain iron equilibrium on very low iron intakes,[16 17] and it therefore becomes evident that no standard figure for optimal iron intake can be recommended without consideration of the factors of age and sex.

Relation to Income

In my opinion iron-deficiency anaemia is much more common among women of the poor classes than the middle and upper classes, but it has not been found possible to obtain a series of the latter type for comparison. Throughout our investigations, however, details of the income and number of dependants were obtained where possible from the women who volunteered for blood examination. The average weekly income was then calculated on the "man-value" basis, and the correlation between this figure and the haemoglobin level was investigated.

TABLE I.—*Haemoglobin Levels according to Incomes*

	Weekly Income	Number of Cases	Average Hb.	Average Age	Hb less than 70 %
332 pregnant women	Less than 15/-	164	73.1	24.3	32 = 19.5 %
	15/- or more	168	79.6	24.8	24 = 14.3 %
140 non-pregnant women	Less than 15/-	97	83.2	24.6	13 = 13.4 %
	15/- or more	43	86.3	24.4	5 = 11.6 %

The results presented in Table I show that both in pregnant and in non-pregnant women the average haemoglobin level is lower and the incidence of anaemia is higher in the groups with incomes of less than 15s. weekly per "man-value." Since there is a difference in the incidence of anaemia between the groups of women whose income is below and above 15s. a week—the latter group averaging £1 a week with very few individuals reaching an income of 30s.—it is not unreasonable to assume that the difference would be more marked if data regarding women of higher income groups were available. This supports our view that in the middle and upper classes, where the diet is not restricted by economic circumstances, the incidence of anaemia is probably much less. Further evidence in favour of this deduction is provided by the investigations of Price-Jones,[18] Williamson,[19] and others, which have shown high haemoglobin levels in women of the middle classes.

Number of Pregnancies

It is not the purpose of this paper to consider in detail the aetiology of the hypochromic anaemia which is so common in women of the poor classes. Our attention will be confined to the two factors which represent the greatest demands for iron—namely, menstruation and child-bearing. It is often held that repeated pregnancies constitute the most frequent cause of the hypochromic anaemia of women. This belief is due to the fact that this form of anaemia occurs especially during the latter part of reproductive life in poor women, many of whom give a history of repeated child-bearing. It has already been shown that women of the older age groups have a greater incidence of anaemia than younger women. Also, it is apparent that on the whole the older women show a greater degree of parity than the younger women. It is therefore obvious that the average haemoglobin levels of women with many previous pregnancies will be lower than those of women with few previous pregnancies, since the average age of the former group will be greater than that of the latter. Thus in a group of 242 non-pregnant women aged from 15 to 44 the average haemoglobin level of those with five or more previous pregnancies was 79 per cent. and of those with none to two previous pregnancies 85.7 per cent. The average age of the former group was 33.5 years and of the latter 25. A similar finding held for pregnant women. The average haemoglobin of women who had had five or more pregnancies was 74.6 per cent., and of those who had had two or less pregnancies 79.2 per cent., the average ages being 34.1 and 23.7 respectively. It is clear, however, that this does not prove that repeated pregnancies constitute a greater iron drain than menstruation, unless the correlation between parity and anaemia can be shown for women of the same age groups. Accordingly an analysis has been made of the haemoglobin levels of women arranged in age groups and divided into those with three or less, and those with four or more, previous pregnancies. The results are shown in Table II, and the average haemoglobin

TABLE II.—*Haemoglobin Levels and Incidence of Anaemia according to Parity*

Age Group		25–29		30–34		35–39		40–44	
Previous Pregnancies		0–3	4+	0–3	4+	0–3	4+	0–3	4+
143 non-pregnant women	Number of cases	51	17	19	23	5	22	—	6
	Average Hb	86.8	82.4	83.9	82.5	80.8	82.0	—	76.3
	Percentage of cases with Hb. less than 70 per cent.	9.8	11.8	15.8	13.0	20.0	18.2	—	33.3
376 pregnant women	Number of cases	160	26	76	39	23	37	5	10
	Average Hb.	79.0	76.9	73.7	81.1	69.4	78.0	69.4	78.7
	Percentage of cases with Hb. less than 70 per cent.	17.5	23.1	27.6	15.4	43.5	21.6	60.0	20.0

levels of the different groups are presented graphically in Fig. 4.

It is seen that for 143 non-pregnant women no correlation exists between average haemoglobin levels and the degree of parity, while for 376 pregnant women the haemoglobin levels are on the whole higher in women with four or more previous pregnancies than in women with three or less previous pregnancies. Table II shows that the incidence of haemoglobin levels of less than 70 per cent. is unaffected by parity in the group of non-pregnant women, and is on the whole less in the groups of pregnant women who had had four or more pregnancies.

It may be deduced, then, that both pregnancies and menstruation cause in poor women demands for iron which are not compensated by the amounts which can be utilized from the diet. The cumulative effect of this

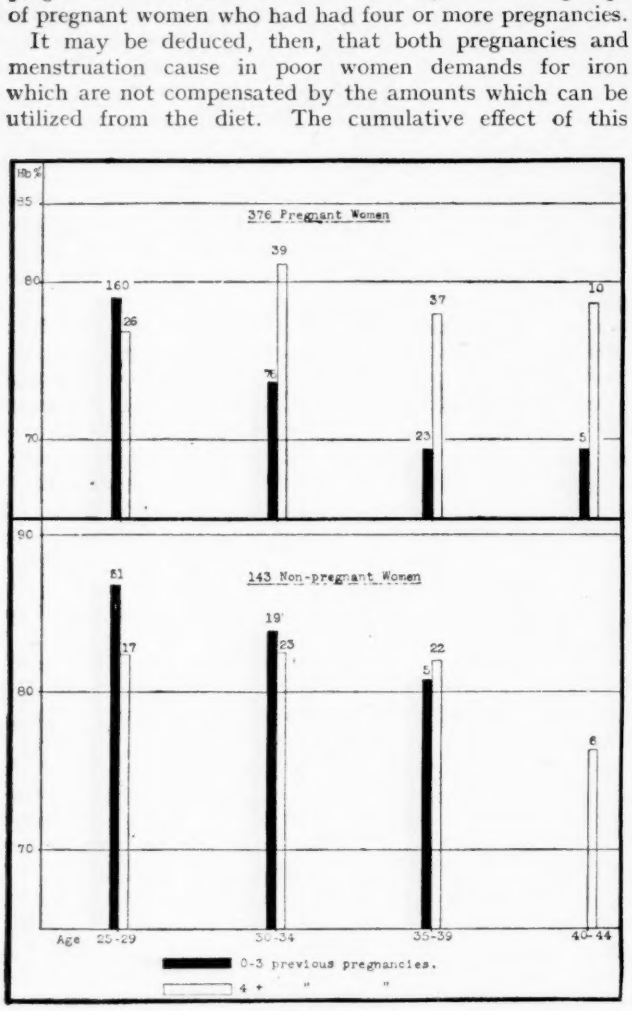

FIG. 4.

negative balance is shown by the fall in haemoglobin level during reproductive life, and evidence has been presented which suggests that in a large group of women the average demands for iron resulting from pregnancy do not exceed and may even be less than the average iron loss resulting from menstruation.

Quantitative Iron Estimations

A consideration of these iron demands on a quantitative basis supports this view and throws much light on the general problem of iron-deficiency anaemia in women. The demands for iron during reproductive life depend in ordinary circumstances on the following factors:

1. Blood loss during menstruation.
2. The supply of iron to the foetus, uterus, and placenta during pregnancy.
3. Iron supply during pregnancy for the increase in maternal tissues other than the uterus and its contents.
4. Blood loss at parturition.
5. Iron content of the milk during lactation.

MENSTRUAL BLOOD LOSS

Several investigations have recently been made into the iron lost in the menstrual flow.[20 21 22] It is a matter of common knowledge that even in women who consider themselves to be quite normal in this respect the amount of blood loss varies greatly. On the other hand, many women who lose only moderate amounts of blood consider the loss excessive. It is therefore unlikely that a woman's estimate of the extent of this blood loss is of much value except in extreme cases. It has been found on analysis of our data that the average haemoglobin levels of women giving a history of excessive menstrual loss are practically the same as those for the entire group of women. The unreliability of the menstrual history has been clearly shown by Fowler and Barer,[22] who found that in a group of women the amount of iron lost at each period varied from 3.5 to 450 mg., and the average figure for ten anaemic women was approximately 120 mg. All of these women considered themselves to have normal menses. In a similar investigation of fifty women, mostly members of a hospital staff, they found that the iron loss at each period varied from 3.84 to 78.4 mg.[21] No woman with a haemoglobin percentage of less than 75 was included in this series, and all gave a normal menstrual history. Estimations of the iron loss during menstruation are being carried out in Aberdeen, but the results at present available are too few to be of value.

It is evident, then, that the degree of menstrual loss varies within very wide limits, and when severe obviously cannot be compensated by absorption of dietary iron. If we regard 2.5 mg. as the maximum daily retention of iron which can occur in women taking the average diet of the poor classes, then the total retention over twenty-eight days is 70 mg. Hence, if the menstrual loss exceeds 70 mg., a negative iron balance which will continue to the menopause is produced by this cause alone. Women taking a diet containing 3 to 4 mg. of iron daily could compensate for a monthly loss of iron amounting only to 30 or 40 mg. These calculations do not take into account the high incidence of achlorhydria and hypochlorhydria, which considerably reduce iron absorption.

We can conclude, then, that menstruation of a degree considered to be normal may produce iron deficiency in many women of the poor classes. Conversely, it may be calculated that only profuse menstruation can by itself be responsible for iron deficiency in women of the middle and upper classes. Widdowson and McCance[4] found that the average intake of "available" iron in middle-class women whose diets were not restricted by income was 7.9 mg. daily. If half of this amount were retained, menstruation would not produce a negative iron balance unless the blood loss exceeded the equivalent of 110 mg. of iron at each period.

IRON LOSS IN PREGNANCY

The iron content of the foetus at term depends on several factors, especially the body weight, the haemoglobin level, and the blood volume. The committee of the White House Conference on Child Health and Protection[23] quote the figures of Hugounenq and Camerer and Söldner for the total of iron contents of eight newborn infants. The average is 341.6 mg., with a minimum of 268 mg. and a maximum of 392 mg. They select the figure of 375 mg. on which to base their calculations of foetal iron reserve. Coons *et al.*,[24] summarizing nine published analyses of the human foetus, find an average total iron content of 395 mg., and Macy and Hunscher[25] state that the foetus has accumulated 246 mg. of iron

at term. It appears, therefore, that 400 mg. can be taken to represent roughly the foetal iron content at term.

Quantitative estimations of the iron content of the placenta have not been found in the literature. Since the placenta weighs as a rule 1 lb.,[26] it is probable that its iron content does not exceed 100 mg.

The uterus at term weighs about 2 lb.[26] and contains, therefore, 50 mg. of iron if 5 mg. per cent. be taken as the iron content of skeletal muscle.[23] It is probable that during involution of the uterus part of its iron content is released and conserved by the maternal organism. If this be so, then 50 mg. should not be regarded wholly as maternal iron loss. The quantity, however, is comparatively small, and in the absence of exact knowledge of its fate shall be taken as part of the iron loss due to pregnancy. Therefore 550 mg. may be considered to represent the total iron supplied to the uterus and its contents during gestation.

IRON IN THE TISSUES

Several authors[25 27 28] have presumed that an additional supply of iron is needed by the mother during pregnancy owing to the gain in weight which occurs over and above that due to the uterus and its contents. Thus, Coons[28] has taken 21 lb. as the average weight gain, excluding the weight of the foetus, and has calculated its iron content by applying the average figure (0.006 per cent.) for iron in the adult body, on the assumption that the lack of iron in the amniotic fluid is compensated by the large proportion of blood in the placenta. She deduces, therefore, that 500 mg. of iron is necessary for this purpose. This deduction is warranted only if such weight gain occurs in equal degree in all the body tissues, particularly those rich in iron—namely, blood and muscle. It is well established that the weight gain is attributable to an increased water content of the tissues and blood, and a diffuse deposition of fat, which disappear to a large extent shortly after delivery.[29 30 31] Therefore extra demands for iron due to this cause may be neglected.

The iron balance studies of Coons,[24 28] in pregnant women having an average dietary intake of about 15.7 mg. iron, have shown that over the whole period of gestation 799 mg. of iron may be retained. This should not be taken to mean that the maternal iron content will be reduced if the retention is less than this amount. Dieckmann and Wegner[32] have shown that there may be an increase in the total circulating haemoglobin during pregnancy. It is probable that such a gain in haemoglobin occurs only in cases where the iron intake is high, and the amount of iron retained over and above that necessary for the uterus and its contents is presumably utilized for this purpose. Increased haemoglobin formation by the maternal organism is likely in cases where there is such a "surplus" iron retention in the presence of a pre-existing iron-deficiency anaemia, or when blood dilution due to physiological hydraemia is marked. Since we are here concerned only with the effects of pregnancy in reducing the maternal iron content, the iron utilized in some cases for new haemoglobin formation need not therefore be considered.

BLOOD LOSS AT PARTURITION

The degree of haemorrhage which occurs after delivery varies within very wide limits, and will be referred to in more detail later. Williams[33] measured the blood lost in 1,000 full-term labours and found that the average loss was 343 c.cm. Similar figures were recorded by Dieckmann and Wegner,[31] Galloway,[34] and Richter, Meyer and Bennett.[35] Thus an average of approximately 175 mg. of iron is lost at parturition.

IRON CONTENT OF MILK

Published data regarding the iron content of human milk show marked variations. Wallgren found an average of 0.044 mg. per cent., and the Committee of the White House Conference[23] quote the figures of several investigators, the average of which is 0.13 mg. per cent. Garry and Stiven[27] take 0.044 mg. per cent. as the mean figure. It is probable that there is an inverse ratio between the quantity of milk secreted and its percentage mineral content. It was found by Schoedel[36] that healthy infants consumed daily 520 grams of human milk in the first month and 885 grams in the fifth month. Macy and Hunscher[25] found an increase in consumption from 640 grams daily in the first to 860 grams in the fifth month. Garry and Stiven[27] consider that the average is an increase from 500 grams to 1 litre daily. This represents an average of 750 grams over the period of lactation. Taking 0.13 mg. per cent. as the iron content and 750 grams as the average daily consumption, we find that the maternal organism loses just under 1 mg. of iron daily by lactation. This is probably a high average figure for the class of women we are considering, since mothers of a poor social class have a milk flow which is 100 grams less than the figures quoted.[27] That it is approximately correct, however, is borne out by the finding of Langstein and Edelstein[37] that normal babies fed with human milk had an iron intake of 0.65 mg. during the fifth month.

Discussion

Hence the iron lost by the mother during pregnancy and the six months after delivery is represented by the sum of 550 mg. (uterus and its contents), 175 mg. (blood lost at parturition), and 180 mg. (iron loss during six months' lactation)—that is, a total of 905 mg. Since sixteen menstrual periods are missed during this time, the total drain of iron resulting from pregnancy and lactation is equivalent to a monthly loss of 57 mg. of iron by menstruation. Moreover, the total drain of 905 mg. of iron occurs over a period of 460 days, and represents therefore a daily loss of just under 2 mg. Hence a woman needs to achieve a positive balance of 2 mg. daily in order to supply the demands of pregnancy and lactation. When the figures for total and "available" iron intake of women of the poor classes in Aberdeen are considered it becomes evident that in many cases such a positive balance cannot be attained, and repeated pregnancies will therefore cause the gradual development of an iron-deficiency anaemia. Also, a quantitative consideration of the loss of iron resulting from pregnancy and menstruation has made it clear that in many cases menstruation constitutes a greater demand than pregnancy, thus explaining our finding that no positive correlation between the degree of parity and the haemoglobin levels or incidence of anaemia can be shown in women of the same age group.

It must, however, be borne in mind that repeated pregnancies may contribute to the production of iron deficiency in ways other than that considered. It has been shown by Strauss and Castle,[38] and Davies and Shelley[39] that the gastric secretion of hydrochloric acid is depressed during pregnancy. Our own results have confirmed this finding. It is therefore not unreasonable to suppose that repeated pregnancies may in many cases cause a permanent achlorhydria or hypochlorhydria, which, by reducing the amount of iron absorbed from the diet, will increase the liability to hypochromic anaemia. Moreover, with an increase in the number of children the income available for food, particularly the expensive iron-rich foods, becomes reduced, and hence the mother is more liable to the development of iron deficiency.

Conclusions

1. Anaemia due to iron deficiency is of very frequent occurrence in women of the poor classes in Aberdeen.

2. The iron deficiency is due to a combination of factors, of which a diet poor in iron and loss of iron during reproductive life are of great importance.

3. Evidence has been presented to show that in the group of 1,534 adult women investigated menstruation constitutes an iron loss at least as great as that due to pregnancy and lactation.

4. A quantitative study of the loss of iron due to menstruation and pregnancy has made it clear that the diets of poor women are very frequently inadequate to compensate for the iron demands of reproductive life.

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The Archives of the Academy of Sciences of the U.S.S.R. in Leningrad have received the first batch of papers belonging to the late Professor I. P. Pavlov. The papers, which were presented to the Academy by Pavlov's widow, comprise some 2,500 letters from scientists in Russia and foreign countries. Most of them relate to the years following the revolution. Among those received before the revolution are several from Metchnikov.

ANAEMIA AND TOXAEMIA OF PREGNANCY*

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The aetiology of toxaemia of pregnancy is at the present time so much under discussion that it is of interest to review any possible bearing that anaemia may have on either its aetiology or its development. It is also of value to consider the relationship of anaemia to the clinical and to certain biochemical findings in patients with well-established toxaemia.

Recent Literature

The references in the literature dealing with the haematological findings are singularly lacking. The majority of writers, however, agree that the anaemia, if present, is in this country of the hypochromic or microcytic type. This anaemia is probably a deficiency state due to lack of iron, and therefore improvement takes place when iron therapy is instituted. In India there is an entirely different state of affairs, as the anaemia is of the hyperchromic or macrocytic type, and is due to some deficiency in the vitamin B complex in the diet. Only occasional cases of macrocytic anaemia are seen in this country, therefore in this paper we shall confine ourselves to the consideration of the hypochromic (microcytic) type of anaemia.

O'Sullivan, in his investigations of pregnant women with albuminuria, either due to toxaemia or associated with urinary infections, found that in the former or toxic group fifteen patients out of nineteen suffered from hypochromic anaemia. In the "pyelitis" group twenty-one out of thirty-two patients who were given iron in addition to the usual treatment for the albuminuria, either of toxic or infective origin, looked and felt better after iron treatment. This improvement was also shown by a diminution in the amount of albumin present and by the rise of the haemoglobin content of the blood and the red cell count. On the other hand, Boycott, in his investigations on anaemia associated with pregnancy, did not find any connexion between anaemia and toxaemia.

A consideration of toxaemia in patients in whom there is pre-existing renal disease such as chronic nephritis led Whitby and Britton to form the opinion that anaemia of the hypochromic type is almost always associated with chronic nephritis. In these patients there is probably a disordered or diminished blood production, and it is not known whether this is due to a nutritional deficiency or to a toxic disorder. The haemoglobin value is usually about 60 per cent. or less if the disease is progressive. Robscheit-Robbins and Whipple, in their recent publication, suggest that anaemia in infective and toxic states in animals is due to a disturbance of the internal metabolism inhibiting the haemoglobin-building powers of the body, and not to a defective absorption or defective formation. They believe that this same factor is often of importance in human disease. Moore, in his series of haemoglobin percentages and blood count estimations amongst pregnant women, found that the lowest average readings occurred in the group of patients suffering from chronic nephritis complicating pregnancy. Stieglitz found that the presence of renal disease hindered the treatment of anaemia in pregnant women, and advised that energetic measures should be taken to combat this anaemia.

* Read in opening a discussion in the Section of Obstetrics and Gynaecology at the Annual Meeting of the British Medical Association, Oxford, 1936.

Present Investigation

Our contribution to this discussion consists of a clinical and biochemical study of a group of patients attending the ante-natal clinic of the Royal Free Hospital, who were subsequently confined in the obstetrical wards of the hospital.

The majority of our patients were young primigravidae, with ages varying from 18 to 30 years. They were more or less of the same financial status. The average income per head per week was 15s. to 17s. 6d., and only in a few patients did the weekly income fall below 12s. per head. The only factor taken into consideration in the selection of the patients was accessibility to the hospital. These patients were divided into two groups:

(1) Patients treated with iron as a routine throughout their pregnancy. (Blaud's pill, 30 grains t.d.s.)
(2) Controls not so treated with iron.

Patients were placed alternately into the iron-treated or non-iron-treated groups, but some of the control series became anaemic (haemoglobin dropping to below 65 per cent.) so that iron treatment had to be started. These cases were eliminated from the present series, and their results will be discussed separately later. All patients were given the same advice with regard to diet and personal hygiene.

Routine Treatment

The diet was a general one containing "protective foodstuffs," and consisting of fresh meat or fish once daily, eggs, butter, an unlimited amount of fresh fruit and vegetables, and a pint of milk daily. Milk was obtained for needy cases through the municipal authorities. The patients were asked to write down a record of their diet for three days prior to each ante-natal visit. At the clinic the dietetic discrepancies were criticized and the shortcomings explained to the patient. The majority of patients were interested in their diet and co-operated with us by bringing truthful records of their dietary, and by adhering to our instructions so far as was financially possible.

At each visit to the clinic the usual routine examination of blood pressure and urine was made, and the presence or absence of toxic symptoms and signs, such as oedema, headaches, nausea, vomiting or heartburn, cramps in limbs, and visual disorders were noted. Haemoglobin percentage, blood urea, blood uric acid, serum carotene, and van den Bergh estimations were also performed as a routine at each visit.

We have analysed and compared the clinical and pathological evidence of toxaemia in our iron-treated and non-treated groups. We had only one case with toxic albuminuria having a blood pressure above 150 mm. Hg, and there were six other patients who showed some clinical toxic symptoms.

Toxic Cases

In our iron-treated and non-treated groups seven patients only had any degree of toxaemia: one patient in the iron-treated group of thirty-five cases; six patients in the control group of thirty-four cases. Of these seven patients three were suffering from a mild to moderate degree of toxaemia, and required admission before delivery for the following reasons:

(1) On account of albuminuria with a systolic blood pressure of 160/90 mm. Hg.
(2) On account of an extensive urticarial rash associated with a blood pressure reading of 146/92 mm. Hg.
(3) On account of excessive vomiting at term with some oedema but no albuminuria.

The case with raised blood pressure and albuminuria was induced at thirty-nine weeks' gestation by rupture of the membranes; the case with the toxic rash was induced medically at term; in the third labour commenced spontaneously at term. The remaining four cases were treated as out-patients.

This small number does not give us much scope for the study of the possible clinical and biochemical findings present during the development of toxaemia. We have therefore drawn up a further series of cases of established toxaemia admitted to the maternity department for in-patient treatment prior to confinement during the same period that our own cases were being investigated. In the general group of in-patient cases sixty-five, or 5.8 per cent. of the total number of deliveries, were toxaemic; these can be subdivided into two groups:

(1) Pregnancy toxaemia (including 2 cases of eclampsia)	61	cases
(2 Toxaemia with pre-existing renal disease	4	„
Total	65	„

All of these patients were suffering from a moderate or severe degree of toxaemia, and required in-patient treatment before confinement. Surgical induction of premature labour was performed in seventeen cases, drug induction in two cases; Caesarean hysterectomy was necessary in one case for severe ante-partum haemorrhage. The remaining forty-five cases were allowed to go into labour spontaneously. Three of the cases were emergency admissions and had not been attended to at the Royal Free Hospital ante-natal clinic.

In this series of toxic in-patients twenty-nine had haemoglobin estimations prior to delivery, and the following table gives the results:

HAEMOGLOBIN (HALDANE METHOD)

Haemoglobin Content:	50–59%	60–69%	70–79%	80–89%	90% +	Total
Cases of toxaemia	1	3	12	9	2	27
Cases of toxaemia and chronic nephritis	1	—	—	—	1	2
Total	2	3	12	9	3	29

Haemoglobin Investigations

In all patients in our iron-treated and non-treated groups the haemoglobin percentage was estimated by Sahli's method, using a neoplan haemometer for comparison, at monthly intervals.

Toxic Cases.—In toxic cases of these iron-treated and non-iron-treated groups we found that in six patients, who were controls, the haemoglobin fell to between 70 and 79 per cent. before toxic symptoms and signs became apparent. In the only toxic case amongst those given iron by mouth the haemoglobin rose from 77 per cent. in early pregnancy to 93 per cent. at term. This patient showed mild toxic symptoms, such as headaches, vomiting, and cramps, throughout pregnancy.

Non-toxic Cases.—The haemoglobin variations found were a rise of 17 per cent. in iron-treated cases and a fall of 8 per cent. in the untreated cases. This rise in haemoglobin percentage was proportionate to the length of iron administration. The iron-treated cases certainly showed a clinical improvement and appeared to be more free from minor infections, such as colds, etc., than the untreated group. This agrees with the findings of Strauss and Castle. Chart I shows the haemoglobin variation in the treated and untreated groups of non-toxic cases.

On analysis of their financial position it was found that there were no really poor patients. In working out the financial status the total income coming into the home was noted, the out-going expenses of rent were deducted, and the remainder divided by the number of dependants.

The result gives the available purchasing power for food, clothes, and fuel per head. An arbitrary dividing line was taken at 17s. 6d. per head per week. Out of seven toxic cases four patients were poor. The incomes of three were 15s., 13s., and 11s. respectively, and there was one unmarried patient at the public assistance rate. The remaining three patients were above the 17s. 6d. level. The financial status seemed to affect the haemoglobin level, for it was found that the patients with low incomes had lower haemoglobins than those in better circumstances.

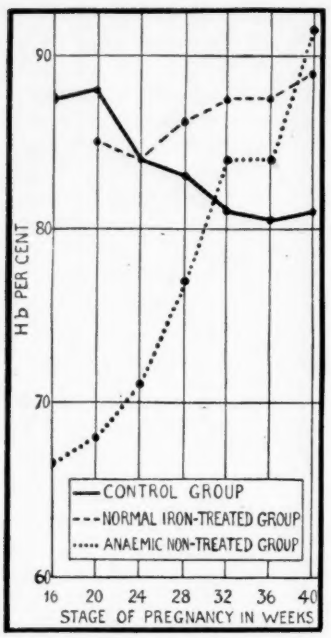


CHART I.—Average haemoglobin variations in the course of pregnancy in three groups of non-toxic cases: a normal group and an anaemic group treated with iron; and a normal untreated control group.

Blood Urea Investigations

Blood urea investigations for both groups were performed at each monthly visit and the values were found to be within the normal variation for pregnancy. The toxic cases showed a slightly raised value up to 36 mg. per 100 c.cm. blood. In one toxic case the blood uric acid was slightly raised one month prior to a raised blood urea. This confirms the findings of most workers that uric acid is a more sensitive indication of impending toxaemia than urea.

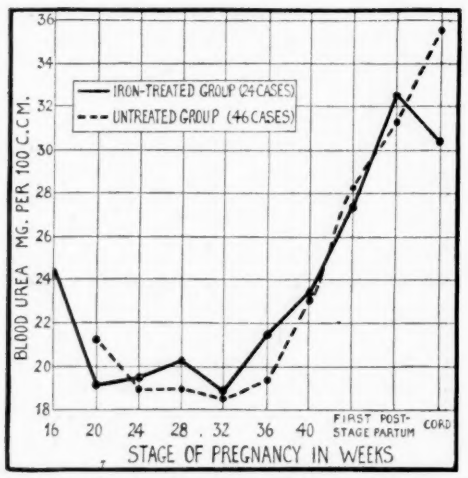
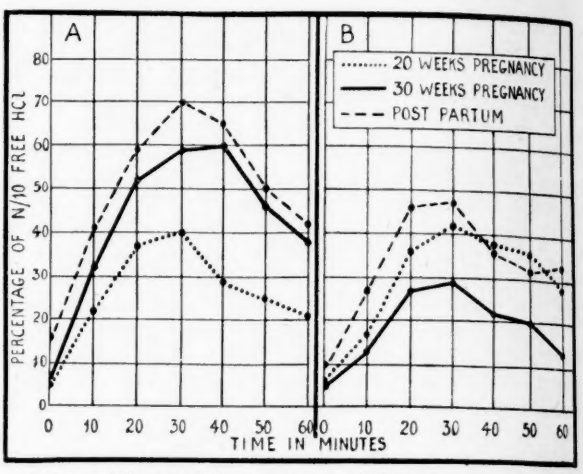


CHART II.—Blood urea variations in non-toxic cases.

Gastric Analysis

In 1932 Strauss and Castle made gastric analyses in twenty-four women during pregnancy, and showed that 75 per cent. did not secrete normal amounts of free hydrochloric acid during more than half the period and, excluding three patients who had a persistent achlorhydria, 80 per cent. of these patients secreted a higher concentration of free hydrochloric acid after delivery than during pregnancy. In further papers Strauss and Castle correlated this relative gastric hypo-acidity with the hypochromic anaemia occurring in the latter half of pregnancy, and demonstrated that this anaemia may be completely relieved by the administration of iron in large doses. In 1934 the findings of Davis and Shelley were in accord with those of Castle and Strauss. They demonstrated a definite reduction in acidity during the last two months of pregnancy. This reduction was only temporary, and was replaced by a return to normal soon after delivery.

In our groups of iron-treated and control patients histamine test meals were performed approximately at the twentieth and thirtieth week of pregnancy, and repeated on the eighth and tenth day of the puerperium. The patient reported to the laboratory fasting, a Ryle tube was passed, and the resting juice withdrawn. Histamine acid phosphate 0.3 mg. was injected and the stomach emptied at ten-minute intervals for a period of one hour. The volume of each sample was measured and the free and total acid estimated by titration against N/10 or N/100 sodium hydroxide, using Topfer's reagent as an indicator. The figures quoted below are those of the total



CHARTS III and IV.—Average variations in percentages of free HCl determined by histamine test meals in two groups of cases: A represents the average of twenty-five summer pregnancies, B twenty-five winter pregnancies. Note the rise in A and the fall in B.

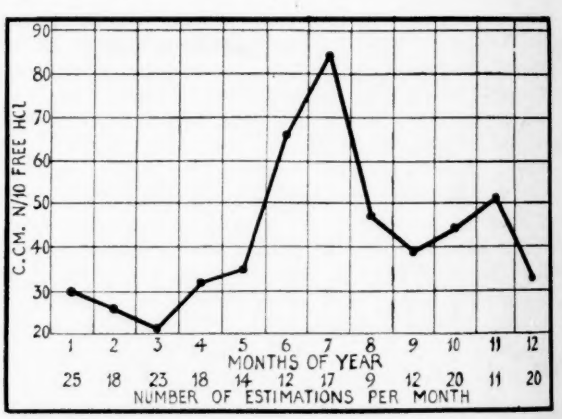


CHART V.—Seasonal variations in gastric secretion. Average results of the total gastric output of free hydrochloric acid in histamine test meals performed each month irrespective of the stage of pregnancy on iron-treated and untreated patients.

amount of free acid, expressed in terms of c.cm. of N/10 acid, produced after the injection of histamine, and also the highest percentage of free acid found in any one of the ten-minute samples.

A study of the first twenty-five cases of our iron-treated and non-iron-treated patients showed that there was in the majority a marked rise in the free hydrochloric acid secretion during the later part of pregnancy. The investigation began during the first quarter of the year and the patients were delivered in the summer and early autumn, so that our test meal performed at the thirty-sixth week of pregnancy came during the middle third of the year. On

continuing the series we found that this rise was not maintained when the patients reached the thirtieth week of pregnancy during the autumn and winter months. These cases showed the drop in later pregnancy found by previous workers (Charts III and IV). The variation led us to analyse our results from a seasonal point of view.

Chart V shows the average total gastric output of free hydrochloric acid in histamine test meals performed each month irrespective of the term of pregnancy, and represents the average results for iron-treated and non-treated patients.

patients as many of these patients were too ill on admission. A few had test meals performed within fourteen days of delivery, and these all fell within the normal limits. In our iron-treated and non-iron-treated groups of patients who developed toxaemia the gastric secretions all fell within normal limits at the twentieth or thirtieth week of pregnancy; it is felt, therefore, that little evidence as to the aetiology of toxaemia may be obtainable from this study of gastric secretion, as the gastric examinations were made eight to ten weeks before toxic symptoms developed.

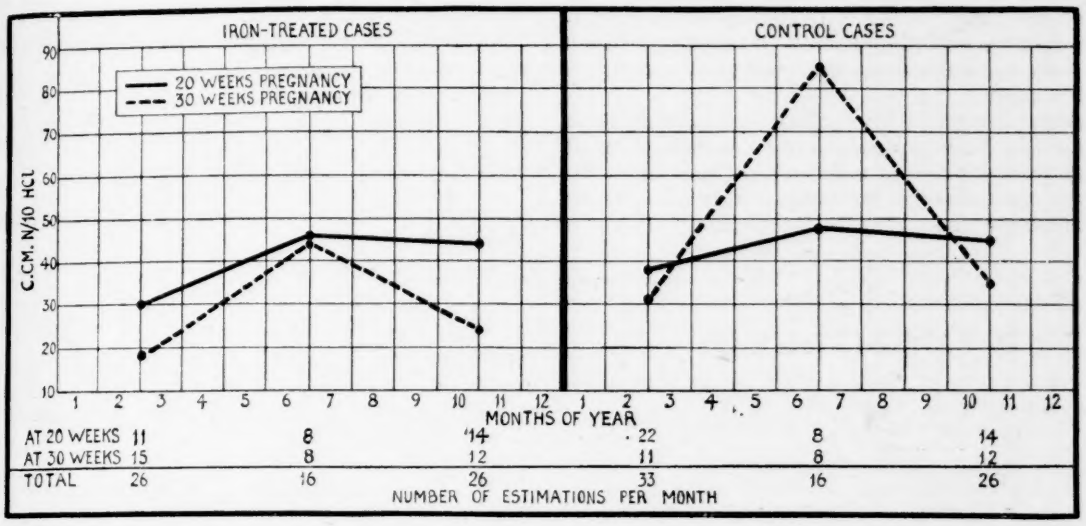

IRON-TREATED CASES
CONTROL CASES
20 WEEKS PREGNANCY
30 WEEKS PREGNANCY
C.C.M. N/10 HCL
MONTHS OF YEAR
AT 20 WEEKS 11 8 14 22 8 14
AT 30 WEEKS 15 8 12 11 8 12
TOTAL 26 16 26 33 16 26
NUMBER OF ESTIMATIONS PER MONTH

CHART VI.—Seasonal variations. Total free acid output in cubic centimetres of N/10 acid.

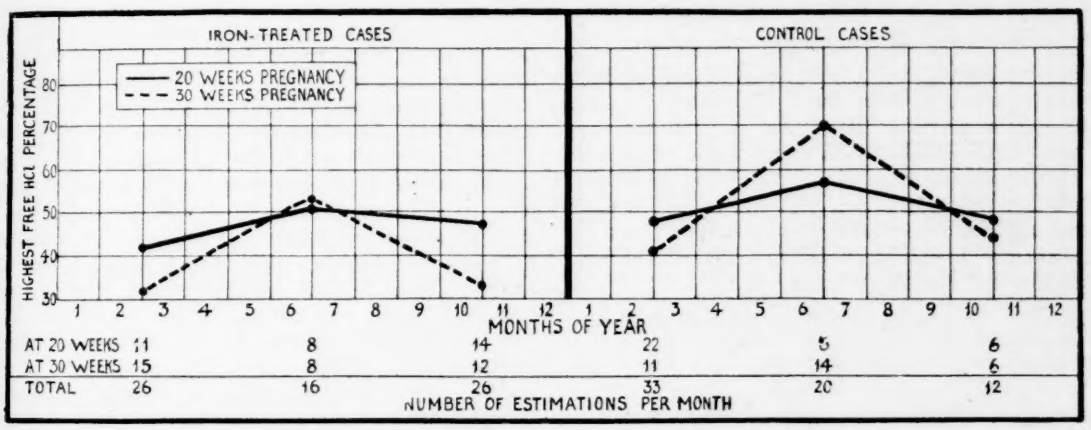

IRON-TREATED CASES
CONTROL CASES
20 WEEKS PREGNANCY
30 WEEKS PREGNANCY
HIGHEST FREE HCL PERCENTAGE
MONTHS OF YEAR
AT 20 WEEKS 11 8 14 22 5 6
AT 30 WEEKS 15 8 12 11 14 6
TOTAL 26 16 26 33 20 12
NUMBER OF ESTIMATIONS PER MONTH

CHART VII.—Seasonal variations. Highest percentage free hydrochloric acid.

The seasonal variation giving a rise in the curve in the summer months is obtained whether the highest percentage of free hydrochloric acid or the total free acid output is plotted. This was found to be the case in the untreated as well as in the iron-treated patients.

Further cases are being investigated, and the series will be published in full shortly. It is possible that the lower gastric secretion in autumn and winter months may be due to intercurrent infections such as colds. Up to date we cannot correlate the gastric secretion with haemoglobin values. In fact, contrary to the findings of Strauss and Castle, we found in certain of the cases a fall in the haemoglobin level associated with a rise in gastric secretion; but in view of the numerous factors affecting both the haemoglobin level and the gastric secretions, further work is essential before any dogmatic statement can be made on the interrelationship of these two variants. Histamine test meals were not performed during the ante-natal period in the general series of toxic

Sugar-tolerance Tests

Sugar-tolerance tests were only done on our iron-treated and non-iron-treated patients at the twentieth and thirtieth weeks of pregnancy, and repeated after confinement at the tenth to fourteenth day. On each occasion a fasting blood sugar was estimated, 100 grams of glucose were given and the blood sugar recorded at half-hourly intervals for two and a half hours. Specimens of urine were passed at one hour and two hours, and were tested for sugar. The results are differentiated into those patients who leaked sugar after 100 grams of glucose and those in whom there was no leak.

In 31.4 per cent. of the series there was no sugar leak, but in 68.6 per cent. a leak was found. The results obtained in both groups are within the normal variations. In toxic patients of these groups the average curves fell well within the normal limit except in the post-confinement curve, where the fall was more delayed. In the three more toxic patients of this series the sugar curves were

more markedly raised about the time of incidence of the toxaemia and in the post-partum period. These results, though few in number, serve to emphasize that the occurrence of a raised blood sugar curve at any stage of pregnancy is of importance. Dietetic treatment by meals with the carbohydrate content evenly spaced can then be instituted to avoid miscarriage or premature birth.

Conclusion

The scope of this paper has been limited to the effect of anaemia as an aetiological factor in the development of toxaemia. The haemoglobin curve appeared to follow the duration of pregnancy: in the untreated cases the haemoglobin dropped persistently, whereas in the iron-treated group it rose. There was no seasonal variation in the haemoglobin curve.

Although some workers have failed to show that there is any connexion between anaemia and toxaemia without pre-existing renal disease, in our small series of cases the incidence of toxaemic signs or symptoms is much lower in our iron-treated series than in the controls. In other words, when the haemoglobin value is kept up in the region of 90 per cent. the incidence of toxaemia is lowered.

We should like to take this opportunity of thanking Professor Amy Fleming for permission to investigate these patients; Professor Robert A. Webb in whose department the work was carried out; the Medical Research Council for a grant allotted to us for this investigation; Miss M. B. Harford, B.Sc., A.I.C., for her technical assistance with the biochemical investigations; and to Mr. Luck for producing the charts.

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MILD RADIUM THERAPY*

BY

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My reasons for presenting a paper on treatment by radium emanation, called indifferently mild radium therapy, radon therapy, emanotherapy, may be briefly stated. Here we have a therapeutic agent which has been used empirically for ages, scientifically for thirty or forty years, and yet is very little known in this country, although now employed abroad in many ways, such as in the form of compresses, sprays, subcutaneous injections, baths, inhalation, drinking-water, etc. Once looked upon by the medical profession with distrust, this form of treatment has now a definite place in physical therapy, and as Bickel of the Charité, Berlin, said:

> "Twenty years' experience of radium emanation therapy has now established the method as a recognized form of medical treatment, and it is likely to be used more extensively in the future."

It is a therapeutic agent now modernized and scientifically used. It was blessed by no less an authority than d'Arsonval in a communication to the Académie des Sciences (June 13th, 1932), after an experience with the gas of over five years. It is being used in no fewer than twenty hospitals in Paris, and also extensively in many countries besides France, notably, Germany, Italy, Czechoslovakia, Spain, Portugal, and the U.S.A., and it is to bring before the medical profession of England this form of therapy, and to have it used in our hospitals as it is being used on the Continent and to induce our spas to add it to their armamentarium, that this paper is presented.

Another reason is to clear the widespread error that radon was dangerous. It is still confused in the minds of many people with radium. Radium and radium emanation are not the same; on the contrary, they are distinctly different, but still too many people, even in the profession, impute to the beneficent qualities of emanation the dangerous properties of radium itself. Radium emanation cannot possibly be dangerous; it is essentially innocuous, and even its opponents, who can hardly be considered authorities on the subject, sometimes admit it may be beneficial.

Alleged Dangers of Radium Emanation

At the outset perhaps it would be as well to recount the origin of the legend of the dangers of radium emanation which gave rise to the well-nigh universal impression that radium gas is dangerous. It is not dangerous. It is from radium and radium salts the danger comes, as the following cases, which are so often quoted, go to prove.

During the years 1917 to 1924 an accumulative total of 800 girls were employed in a factory in New Jersey, U.S.A., painting the dials of watches and clocks with luminous paint. This paint contained phosphorescent zinc sulphide, activated by means of small amounts of radium and its congener, mesothorium. Several of the girls employed developed a very resistant infection of the jaw, with buccal lesions and marked anaemia, and later they died of carcinoma.

It is important to note that it was only the girls who had worked steadily in this painting for from one to two or more years who showed effects of radium poisoning.[1] In these factories the radium paint was mixed with acacia, which was thinned out with distilled water, and given to each girl in a porcelain crucible. It was the habit of most of these girls to point the tip of the camel-hair brush used in painting with their lips, so that a more accurate work could be performed. The material for the painting was sticky and adhered to gums and teeth, and was difficult to expectorate; one girl stated it was gritty, and she always swallowed it, as doubtless did the rest of the girls. The report showed that in six months anything from 360 micrograms to over 5 milligrams of radioactive substance might have been swallowed.

The other case so often quoted, which must be mentioned only in order that the danger of radium emanation may be refuted, is that of a gentleman of Pittsburg, who drank thrice daily, for a considerable period, a solution of soluble radium and mesothorium in an endeavour to rejuvenate himself and improve his golf. He developed carcinoma and died.

So these cases, arising as they do from radium itself or radium salts, have nothing whatsoever to do with mild radium therapy.

* Read in opening a discussion in the Section of Physical Medicine at the Annual Meeting of the British Medical Association, Oxford, 1936.

The ingestion of radium salts, as I have related, as done by these girls, or as the gentleman from Pittsburg did, is totally distinct and apart from the administration of radium emanation as it is given in mild radium therapy. Radium salts ingested will undoubtedly leave active deposits of radium in the bones, which will remain there active for 1,750 years ; but no matter what the quantity of radium emanation be taken it is all gone in 3.85 days.

Furthermore, it has been stated also that radium emanation killed the miners in the radium mines at Ste Joachimstaal ; but as I pointed out in 1934[2] it was not until the pneumatic drills were used that there was any dangerous trouble of the lungs, and it was by the inhalation of the dust containing radioactive substances that the trouble came. Again radium solid particles and not radium emanation.

Rise of Emanotherapy

At several congresses abroad which have taken place in the last few years the subject of emanotherapy has been given a definite place ; at Zurich, Liége, Paris, Copenhagen, and Stockholm it was freely discussed, and I felt that this Annual Meeting of the British Medical Association should not take place with the subject of emanotherapy unmentioned, and radium emanation, Cinderella-like, left out of the party. For I venture to prophesy that, even as Cinderella, it will one day be appreciated and take an important place in the world.

When I said that radium therapy had been used empirically hundreds of years ago I referred to what was termed the Holy Earth, which can be seen to-day in the leather bags of Bohemia, or, as it is now called, Czechoslovakia. These I have seen in the neighbourhood of Ste Joachimstaal mines, whence came the ore from which Madame Curie first extracted and identified radium. These bags were the forerunners of the radium pads of to-day. In the eighteenth century the attention of scientists was directed to Bad Gastein and other German springs. Baron Liebig described their healing qualities a hundred years ago, and later Burckhardt Elbe came to the conclusion that the waters contained a gas which in due time would be identified as the active substance, and in the year 1903 the gas was recognized as radium emanation. Other examples of its therapeutic value recur through history. In France it was said of the spas: " The baths preserve the health and give the ' joy of life.' "

And so in different countries, notably Germany perhaps, the same idea keeps recurring. The springs have such names as " The Spring of Eternal Youth," " The Spring of Rejuvenation and Regeneration," " The Spa for the Ancients," " The Fountain of Perpetual Youth." The legend of the revitalizing power of the waters has existed throughout the ages in all those countries where healing springs have been found, and has persisted from time immemorial even up to the present day.

Mild radium therapy has the endorsement of some of the greatest men in the world. D'Arsonval I have already mentioned ; Dausset of the Hôtel-Dieu in Paris only two months ago told me that he had done over 20,000 cases without a single mishap.

Among others who have testified to the therapeutic value of this form of treatment are: Professor Eiselsberg, one of the world's surgeons, holder of the Lister medal ; his successor, Professor Denk ; Professor Felham, doctor to the former Empress of Austria ; Professor Ortner, doctor to the late Emperor Franz Joseph ; Professor Lorenz, head of the Lorenz Orthopaedic Clinic ; Professor Singer, the internationally known authority on rheumatism ; Professor Novak, the gynaecologist ; Professor Wenckebach, the heart specialist ; and Professor Newmann, the throat specialist, who lectured a few years ago before the Royal Society of Medicine ; in Berlin, Professor Sauerbruch, who gave the name to the famous chest operation ; Professor von Lichtenberg, the eminent neurologist ; Professor Cramer, one of Berlin's leading physicians ; Professor Goldstein, the famous nerve specialist ; and in Munich, the internationally known gynaecologist, Professor Döderlein.

And the subject of emanotherapy has not been altogether unknown by authorities in this country. Mutch in the *Lancet* (1911), Luff in his book on Gout, Bannatyne of Bath in Hutchison's *Index of Treatment*, Dawson Turner in *Radium and its Physics and Therapeutics*, and Davy Luke in *Spas and British Health Resorts*—all speak favourably of this form of treatment.

It is needless to enumerate the spas abroad where this treatment is used. You are all familiar with them, and they are each proud of the radioactivity of their waters and of the results obtained therefrom ; but in our own country, perhaps, Bath stands almost alone in its radioactivity. A great deal of the value of spa treatment is due to radioactivity, and on the Continent especially the higher this property the more health-giving the spring is reputed to be, and in a great measure the spa treatment is mild radium treatment. It is far from my intention to decry or to undervalue either the treatment or its value, but if a criticism is to be made it would be that it appears to fall short of perfection in the matter of accuracy of dosage, and this brings me to describe the apparatus by which to-day accuracy is ensured.

It was on the suggestion of Professor d'Arsonval and under his direction that one of his pupils, Dr. Vaugeois, invented generators of emanation or radon emanators. These are generators of a pure emanation, without danger, and of constant and known output. They are easily transportable, and allow of the emission of radon gas in a definite quantity in a given time.

Methods of Administration

Reference to Fig. 1 will show the principle of an emanator. A is a metal tube in which is inserted, in a small container (B) a given quantity of radium salt The quantity of radium salt is that which is sufficient to give off a definite quantity of radium emanation in a given time. For example, this tube will produce 1,000 millimicrocuries of gas in twenty-four hours. Perhaps it

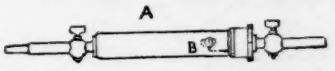

FIG. 1.—Radon emanator. Scale 1/4.

would be as well here to explain how the gas is measured, and the following table will show.

1 curie = that quantity of emanation in equilibrium with 1 gram of radium element.
1 millicurie = 1/1,000 curie.
1 microcurie = 1/1,000 millicurie.
1 millimicrocurie = 1/1,000 microcurie.

If we wish to administer the emanation by means of drinking-water (Fig. 2) we pour some water into a bottle, put the cork into the bottle, and then put the emanator on to the cork, turn the tap of the cork and the tap of the emanator on so that the emanation, having an atomic weight of 222, falls down, by reason of its weight, and at the end of twenty-four hours the 1,000 millimicrocuries will have been absorbed by the water, which is then ready to drink.

Another method of administering it is by subcutaneous injections, and it is to this method that Professor Dausset refers, and is one almost exclusively used by him. Here we have the same emanator, and it comes in a box with

the hour and date entered on it, which can be adjusted each time it is used. A needle is fastened to one end and a cylinder of oxygen to the other. The rate of flow is regulated so as to produce 35 to 50 cubic centimetres per minute, and it is also filtered by means of cotton-wool. The gas is allowed to flow for three minutes, by which time the oxygen has emptied the emanation and carried it into the subcutaneous tissues. The treatment is painless. There are several other forms of syringe for the subcutaneous or submucous injections into which we need not enter here.

Another method of administration is by rectal insufflation, and indeed this is the method of choice for certain

FIG. 2.—Radon emanator for drinking-water. Scale 1/4.

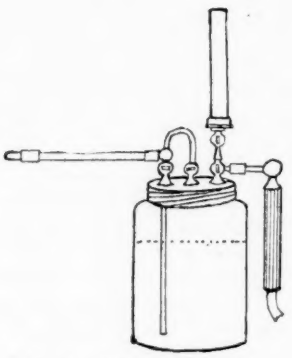

FIG. 3.—Radon insufflator. Scale 1/8.

gynaecological affections. In this method a large rubber catheter is used ; it is attached to one end of the emanator and the other to the oxygen cylinder or the double-bulb air syringe, and this latter arrangement the patient can manipulate herself.

Another method of emanotherapy is by means of a spray (Fig. 3). The gas as before falls down to the water and the air pumped through the water carrying the emanation to the affected part. This is not only used in gynaecology but also in oto-rhinology.

Nor must the treatment by the application of radium pads be omitted. These I have used since 1912, after reading Dr. Mutch's article in the *Lancet* (1911). Each pad consists of a dry compress of radioactive substance sewn in a bag of waterproof material, which in turn is contained in a loose washable cover. These are applied to the painful area and kept in position by a bandage, and left in position for hours or even days.

In this connexion mention must be made of the thermo-radio pad, described in the *Lancet* (February 22nd, 1930) ; the benefit obtained was derived from a combination of radium emanation and equable heat. Logically it is impossible to say whether the benefit resulted from the one or the other of these two therapeutic factors or from their simultaneous action. If so, it is only fair to record that this is not the only example of mutual intensification where synergic action has been used in physiotherapy. There are several other instances which will doubtless be called to mind by physiotherapists.

Another outward form of application is radium emanation ointment or pomade. Here we have an activated ointment which is spread on the skin and covered with tinfoil and strapping applied and left on for a varying number of hours. The objection to this is that it is only manufactured abroad and by an expensive apparatus, but doubtless time will overcome this obstacle.

Inhalation is, like the pads, one of the oldest forms of administration. The Romans used to build rooms or tents over the springs where the gas was rising from the earth, and they were known as emanatoria. The modern emanatorium is usually a room, and the radium gas is pumped into the room, and patients remain in it for an hour or more. This is an example of inaccuracy of dose. The quantity of emanation varies in almost every part of the room, the tendency, of course, being for the greatest quantity to be on or near the floor, and it will be readily recognized that there are other ways in which the quantity will vary. Many methods have been tried to overcome this, one of which is a mask ; but even with this it is difficult to say really how much emanation the patient inhales. By the aid of Major Collison and an engineer a rather elaborate but absolutely accurate machine has been devised, but a description is out of place here.

Indications for Mild Radium Therapy

The class of disease in which radium emanation treatment is indicated and in which it has been used and found beneficial one may summarize for general terms as follows :

1. In " gout and goutiness," to borrow a title so well chosen by Leonard Williams. In rheumatisms, especially those of infectious origin and characterized by pain. In fact radium emanation would appear to exercise a sedative action on most varieties of pain.

2. Mild radium therapy has been successfully used in certain gynaecological conditions, notably pelvic pain and congestion, and salpingitis, and is used extensively in the treatment and cure of sterility.

3. In dermatology such skin affections as psoriasis, mycosis fungoides, eczema, and lichen have benefited from its use.

4. In diseases of the respiratory organs and upper air passages chronic catarrhal conditions and affections of the sinuses have improved with the use of mild radium therapy.

5. Much as I object to the term " rejuvenation," the age-old reputation with which radium emanation is endowed cannot be omitted and would appear to be more or less justified. I think perhaps " revitalizing " is a better and less misleading term than rejuvenation, and certainly it is this quality which makes the treatment useful in convalescence, notably from septic troubles. It is eminently suitable in the complaints of middle and old age, premature ageing more especially, in recuperation, in cases of exhaustion or weakness following operation, long illness, or overwork.

Rationale of Radon Gas Therapy

To bring the uses of emanotherapy up to date its value in the treatment of mental disorders is forcibly brought to the notice of the medical profession by the recent report of the medical superintendent of the Crichton Royal Institution in respect of the year 1935,[4] which is as follows :

" It is an interesting coincidence, and a possible and suggestive explanation, that towards the end of 1931 the artesian water supply of the Institution was considerably increased by the boring of another well, providing twice as much water as the former well, and that the water of the new well is two and a half times as radioactive as that of the old well. The radioactivity of the waters of the two wells was carefully examined and estimated by Professor James Muir, D.Sc., of Glasgow, who found that the water from the old bore has 60 units of temporary radioactivity or the average for deep wells, whereas that from the new bore has 150 units.

" Radiotherapy has hitherto not been employed in the treatment of mental diseases, and probably mainly for the reason that mental disorder is not a ' localized ' affection, like cancer in its early stage, which can be treated by carefully localized application of radium. Mental diseases, on

the contrary, are affections of the whole body, mind, and personality, and their therapy involves the treatment not only of the brain and nervous system, but also of the whole organism, including, in addition, the individual's social relationships. The characteristic process of the bodily chemistry or metabolism is oxidation, and notably in melancholia and dementia the basal metabolic rate is lowered, with resulting accumulation in the system of unoxidized and other toxic products of metabolism. If the proved curative effects of certain radioactive mineral springs in gout and allied affections of the fibrous tissues, muscles, and joints are attributable in part to their radioactivity, they possibly operate in this respect by stimulating the metabolism and activating the oxidative processes of the body. If this surmise is correct, then there would seem to be a sound reason for the use of radium in the treatment of mental diseases, in some mild and generalized form, as by the drinking of radioactive waters and the taking of radioactive baths ; and possibly this may help to explain the improvement in the recovery rate at Crichton Royal during the past four years—that is, since the opening of the new artesian well towards the end of 1931, with its more copious supply of more radioactive water than that of the former well."

The theory of the manner in which radon gas exercises its beneficial effects one may gather from the above report. The French authorities state that emanotherapy brings about the restoration of the vital potentials of the cell and places them again in a state of equilibrium. This effect is produced either by stimulation or by sedation.

Stimulation in the Case of Hypofunction.—Here we have a threefold action: (*a*) an action that would appear to be almost specific in diseases which are due to a slowing down of metabolism ; (*b*) a detoxicating action, brought about by the elimination of the microbic metabolic toxins which were paralysing the cellular function ; (*c*) an auto-infective action due to phagocytosis.

Sedation.—This is due either to the stimulation of the hypofunction as above or to a sedation or slowing down of the hyperfunction, as a result of which there is: (*a*) a sedative action on pain by the action of radon on the irritated nerve cell ; (*b*) a regulation of the sympathetic system, by reason of its action upon the basic and primary (cellular) cause of the pathological condition.

In other words, the action of radon is indirect, affecting not so much the involved organ or tissue as the body as a whole. This is brought about by a direct transference of energy from the emanation to the tissues, one result of which is increased oxidation of the cells, thereby favouring osmotic exchanges and elimination of waste products.

Conclusion

These findings suggest, as a possible rationale for emanotherapy, that the emanation, by virtue of its positive and negative charges, may remove the electric charges from the body colloids, and have a stabilizing action resulting in a sedative effect on the tissues.

The rationale of the radon treatment of rheumatism is one of oxidation and detoxication. As Dr. Buckley said, when writing on the treatment of arthritis recently: "The one indisputably sound line of treatment in all cases is to raise the patient's resistance to a point which will enable the infection to be overcome."[5] And there is no doubt that treatment by mild radium therapy does raise the patient's resistance in a remarkable way.

Of emanotherapy we shall learn more as time goes on, and of its rationale and the way in which it works ; and with this knowledge we shall find new channels for its activities. In the meantime, it behoves us to proceed with caution, but also with diligence, in close co-operation with the scientist and our fellow workers, and devote to it, and to the work of others, that same attention which has brought many of the more recent physiotherapeutic measures into practice.

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GASTROGENOUS POLYNEURITIS

BY

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Over many years literature has accumulated relating to cases of widespread peripheral neuritis, unrelated to any obvious causal agent and often fatal. In the last six years I have encountered seven examples of severe polyneuritis, in each of which there was some associated disease of the stomach. It occurs to me that this association may not be a matter of mere coincidence, and that if in all cases of polyneuritis of obscure origin a full gastric investigation were undertaken a causal relationship might be made out between gastric disease and the general involvement of the peripheral nerves.

I have had no opportunity of investigating any case of progressive hypertrophic polyneuritis, such as was described originally by Déjerine and Sottas, in which a familial tendency to the occurrence of the disease is striking. On the other hand, a paper by de Bruyn and Stern[1] gives a very full account of a case which they studied. It relates to a male, whose symptoms began at the age of 49, and who died three years later. The immediate interest of this paper lies in the fact that the patient's sister and two brothers had died previously after an illness characterized by vomiting, diarrhoea, wasting, and pains in the limbs ; in the brothers, no free hydrochloric acid was present in the gastric juice. In the case described in the paper hydrochloric acid appeared only after two hours' digestion.

Harris[2] reports a case of relapsing interstitial hypertrophic polyneuritis, in which the attacks of weakness, loss of sensation, paraesthesiae, and loss of tendon jerks were intermittent, with complete recovery between ; death followed six years of illness. There is no note of any gastric investigations. The same author[3] in 1935 writes again on chronic progressive (endotoxic) polyneuritis, and describes five cases of the relapsing variety. He suggests that all cases of recurrent or progressive polyneuritis, excluding Déjerine's familial type, whether associated with enlargement of the nerves or not, be grouped together as variations of a disease and be described as chronic progressive endotoxic polyneuritis. This suggestion clearly visualizes the production of some toxin as yet undetermined in the body, and the definition may be taken to exclude obvious causes of polyneuritis, such as poisoning with arsenic and other substances, gross sepsis, and so forth. My interest in the matter arose through the observation of cases already referred to, which I will describe briefly.

Case Reports

CASE 1.—A male of 42, complaining of pains in the legs, loss of power in the legs, hands, and arms, numbness of the feet, and general malaise, had a sensory loss of glove and stocking distribution ; loss of knee-jerks and ankle-jerks ; tender calf muscles ; pronounced wasting of the muscles in the legs, hands, and forearms ; and the reaction of degeneration in the peronei and anterior tibial group. The nerves were not obviously thickened. General examination revealed no other abnormality and the Wassermann reaction was negative. The disease progressed rapidly and in three weeks vomiting began

and persisted until death, six weeks after he was first examined. At necropsy a carcinoma of the pyloric end of the stomach was found, with well-marked evidence of chronic gastritis.

CASE 2.—This was a woman of 52, whose symptoms and signs were sufficiently like those of the first case to make a detailed description unnecessary. Again vomiting started some weeks after the onset of polyneuritis, and, in view of the earlier experience, carcinoma of the stomach was diagnosed, and this diagnosis was confirmed at necropsy.

CASE 3.—A year later a man of 48 was admitted to Guy's Hospital under my care with a long history of recurrent attacks of epigastric pain, with remissions of several months. A relationship of food to pain could not be elicited. During the last six weeks he had vomited persistently, and often large amounts. Four weeks before admission he developed widespread polyneuritis and presented the usual classical signs of this disease. On examination, apart from evidence of polyneuritis, there was general emaciation and visible gastric peristalsis. The test meal revealed a great excess of mucus in the stomach and no free hydrochloric acid. *X*-ray examination showed a high degree of pyloric obstruction. At operation a healed duodenal ulcer was found to be the cause of the trouble, and recovery followed gastro-jejunostomy. With improvement in the general condition the signs of neuritis receded, and in three months the patient was completely well.

CASE 4.—A woman aged 35 was seen on account of pains in the limbs and wasting of the muscles of the hands, forearms, and, to a less extent, of the legs. Again there was objective evidence of polyneuritis of uncertain origin. A thorough investigation revealed complete achylia associated with slight anaemia, the haemoglobin being 75 per cent. and the red cells 4,200,000. She was treated with hydrogen peroxide stomach washouts (2 drachms to the pint), a non-irritant diet, ferrous carbonate 30 grains daily, and a tablespoonful of ventriculin daily. She recovered completely in two months and has since remained well for two years.

CASE 5.—In a man aged 48, with a long history of gastric ulceration, a large ulcer was shown radiologically on the lesser curvature, and the test meal revealed a great excess of mucus in every specimen, no free acid for the first hour and a half, and a trace of visible blood in every specimen. For three weeks before the consultation he had noticed increasing weakness of the lower limbs, tingling and pain in the feet and calves, and some numbness of the tips of his fingers. Again, he presented objective evidence of polyneuritis. The orthodox treatment of gastric ulcer was instituted; all his symptoms disappeared in a month, and *x*-ray evidence of active ulceration disappeared in three months. The test meal at this time showed a disappearance of mucus and a normal acid curve. The polyneuritis progressed for the first three weeks of treatment and then gradually improved, to disappear after four months.

CASE 6.—A male aged 60, a resident of South Africa, came to me in May, 1935, complaining of increasing weakness of the arms and loss of vision. There was also a history of recurrent attacks of gout. Eight years ago he had had pains in the stomach of a cramp-like nature and unrelated to food. He then developed for the first time pronounced weakness of the arms and forearms, and slight weakness of the legs, in conjunction with pains and paraesthesiae. The disease progressed so rapidly at that time that a neurologist in attendance gave him only three weeks to live. He had recovered fully in three months, except that his arms were not quite so strong as previously. Four years ago he had a similar attack, starting with pains in the stomach, and he then developed loss of peripheral vision. He was told at the time that he had in fact gun-barrel vision. He made an incomplete recovery from the weakness and had a further bout a month before I saw him. On examination of the upper limbs there was marked wasting of the muscles and absence of the tendon jerks. There was slight loss of sensation in the fingers, weakness of dorsiflexion of the feet, tenderness of the calf muscles, and the ankle-jerks were depressed. Visual acuity was normal in the central fields of vision but entirely limited to them. The appearances of the disks were those of optic atrophy; it is conceivable that this might have been brought about by injections of N.A.B. given in the attack four years before. The blood Wassermann reaction was negative and the cerebro-spinal fluid was in every way normal. The blood uric acid was raised to 6.5 mg. per 100 c.cm.; the blood count was: red cells 4,200,000, white cells 2,400, haemoglobin 65 per cent. The faeces contained no arsenic or lead, but bacteria of the Salmonella group were cultured from them. The blood calcium was 9.2 mg. per 100 c.cm.; sedimentation rate—at one hour, 12 mm.; at two hours, 34 mm. *X*-ray investigation of the alimentary tract revealed only a tender appendix. There was marked tenderness of the gall-bladder but no disease of this organ could be shown radiologically. A fractional test meal revealed excess of mucus in every specimen, and free acid in the half-hour specimen only when it rose to 0.036 per cent. This case was seen later in consultation with Dr. C. P. Symonds, who agreed that it was one of relapsing polyneuritis. A somewhat unsatisfactory biopsy was carried out, but the report on the tissue examined by Dr. Greenfield was to the effect that, although there was a normal proportion of large and small myelin sheaths, the total number of fibres was greatly reduced. In the normal the fibres showed 5,000 to 9,000 per sq. mm., whereas in this case two nerve bundles gave counts of 2,600 and 4,500. Treatment consisted of a diet free from meat—in view of the gout; cinchophen, iron and ammonium citrate, hydrochloric acid and pepsin, and a tablespoonful of ventriculin daily. He made rapid inmprovement, and at the end of the year wrote to the effect that he was fully active and riding horseback.

CASE 7.—A doctor aged 37 consulted me in August, 1935, on account of attacks of diarrhoea and anorexia and recurrent attacks of weakness in the hands and fingers. For the last three years the tendency to diarrhoea had been increasing and was associated with vague discomfort in the epigastrium. Fifteen months before he had had an attack, diagnosed as polyneuritis, characterized by wasting of the muscles of the hands and legs, with weakness. He improved gradually, but whenever the diarrhoea became troublesome the tingling in his fingers and weakness of the hands were worse. On examination there was demonstrable wasting of the small muscles of the hand and slight loss of sensation in the finger-tips and also in the toes. There was tenderness of the calf muscles. The reflexes were unaffected. In view of the previous cases a diagnosis of relapsing polyneuritis, associated with achylia, was made. A fractional test meal showed complete absence of free hydrochloric acid throughout, an excess of mucus in the stomach, and a *p*H which varied between 6.2 and 8. The blood count was normal. Treatment consisted of two teaspoonfuls of ventriculin daily, 25 minims of acid. hydrochlor. dil., and 60 minims of glycerin of pepsin twice daily. After two months the symptoms had almost abated and there had been no more diarrhoea. Since then no further relapse has been reported.

Conclusion

In reviewing these cases it will be seen that the only constant feature, apart from polyneuritis, is a disturbance of the stomach, which involves a reduction or complete absence of free hydrochloric acid. The current view is that most cases of achlorhydria or of achylia present this condition as the terminal result of chronic gastritis. When atrophy of the mucous membrane of the stomach, and possibly of the first part of the duodenum, is complete, then pernicious anaemia and subacute combined degeneration are prone to arise, owing to the absence of the as yet unidentified substances known as haemopoietin and neuropoietin. Now, in some cases of subacute combined degeneration there is also evidence of polyneuritis, and it seems to me not unreasonable to suggest that the health of the peripheral nerves is, like that of the spinal cord, dependent upon an adequate supply of neuropoietin or of some allied substance from the gastric and duodenal mucosa.

In view of these cases, which are at least highly suggestive, I feel justified in postulating the possibility of the existence of a gastrogenous polyneuritis, and I hope that this communication will lead to the routine investigation of all similar cases by means of a fractional test meal. In this way it should not be difficult, within a short time, to decide whether the conclusion is justifiable or not.

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BLOOD REPLACEMENT AFTER HAEMORRHAGE

WITH AN ILLUSTRATIVE CASE*

BY

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Some twelve months ago I read a contribution before a meeting of this society in which I brought forward some suggestions relating to the treatment of the post-haemorrhagic state.† Since that date a number of points have been raised in various quarters, so, with your permission, I shall take this opportunity for making a few further observations on the subject.

Outline of Procedure

The following are, in brief, the essentials of the procedure which I advocate. With the patient lying in bed with not more than one pillow, warmth is provided by means of blankets and suitably protected hot-water bottles; the head is lowered, the bed being levelled before a catheter is passed or an intravenous infusion is commenced; sedatives, of which morphine salts seem to be the most efficient, are given to allay anxiety and restlessness; and fluid is provided by way of the mouth and rectum. Bandaging of the limbs entails avoidable disturbance of the patient, and the application of an abdominal binder tends to hamper still further the already embarrassed respiration, and for these reasons such treatment is not favoured. Circulatory stimulants were found to be of very doubtful efficacy, therefore they are not given unless special indications are present. If the blood pressure falls to 80 mm. Hg, or fails to rise above 90 mm. Hg after routine nursing treatment, a pint of ephedrine-glucose-gum solution is slowly infused into a vein; and if, in spite of this treatment, inanition persists, or recurrent syncopal attacks and sighing respiration continue, preparations are made for the performance of a blood transfusion.

The method of blood replacement after severe haemorrhage is an important problem not infrequently encountered in obstetric practice. Intravenous infusion is necessary in the more serious cases, as the state is an acute one, and fluid should be introduced into the blood vessels, where it is urgently required, without delay. Indirect methods, such as the subcutaneous or intravenous drip methods, are too slow when the blood pressure is very low, as absorption is delayed, and the patient will retrogress until the veins are filled. When the condition of the patient is so grave that intravascular infusion is indicated, the choice of the fluid for injection is a matter for careful consideration.

The Fluid for Infusion

The qualities of the ideal solution would be such that it would raise the blood pressure to normal levels after infusion, remain in the vascular system, restore an efficient circulation, and counteract tissue starvation and anoxaemia. The only liquid which has properties approximating those of the ideal solution is whole blood, but the preliminaries, including the finding of a suitable donor and the matching of the bloods, which must be carried out before a blood transfusion can begin, often take three or four hours to complete. During this interval it is possible that a serious retrogression will take place unless other active treatment is undertaken.

After having tried several alternatives, I have decided that the most efficient solution for intravenous infusion in this class of case is one with the following composition:

Ephedrine hydrochloride	1 grain
Glucose	440 grains
Gum acacia	525 ,,
Water	to 1 pint

which may be reinforced by an intramuscular injection of ten units of insulin.

The blood pressure level is dependent upon the volume and viscosity of the blood, the peripheral resistance, and the force of the ventricular contraction. Ephedrine-glucose-gum solution, on introduction into a vein after a blood loss, restores the diminished blood volume to an appreciable extent, and, by reason of its colloidal nature, is likely to be retained in the vascular system. Its viscosity is almost the same as that of normal blood, and the ephedrine which it contains helps to raise the peripheral resistance. Further, the intravenous infusion of this fluid ensures that adequate venous filling of the heart will take place during diastole, and therefore that the force of the ventricular contraction will approximate to normality.

In an efficient circulation the blood pressure approaches normality, an adequate supply of oxygen and of nutriment is made available to the tissues, and waste products are satisfactorily removed. This solution, on infusion, raises the fallen blood pressure following exsanguination by the means to which I have just referred. If not given in excessive quantities, although it does not provide erythrocytes, it accelerates the circulation and keeps those already present in motion, therefore ensuring that they will work with maximum efficiency to aid oxygenation of the tissues and to dispose of waste products. In addition, it supplies glucose directly to the tissues, and the adsorption and utilization of this glucose is assisted by an intramuscular injection of insulin.

In practice it has been found that the procedure which I have outlined can be most helpful if properly applied. The only important contraindication to its use seems to be surgical shock, which may be adversely affected by ephedrine.

Case Report

The following case illustrates the application of this technique with a favourable response.

Mrs. X was admitted to the Princess Mary Maternity Hospital in December, 1935, as a case of incomplete abortion at three months' gestation. She had missed one menstrual period, and, since that time, had had two months' intermittent uterine haemorrhage of minor degree. Twelve hours before her admission to hospital a profuse haemorrhage commenced, and this stopped after vaginal plugging by her medical attendant.

On arrival at the hospital she was unconscious and grossly collapsed, her skin being pallid and cold, her breath cold, and her limbs flaccid. Her pulse was impalpable at the wrist, and her heart rate was uncountable at the apex. The systolic blood pressure was between 70 and 80 mm. Hg, and the diastolic blood pressure could not be ascertained.

Routine nursing measures, such as application of warmth and lowering of the head, were instituted without delay. A few minutes later the median cubital vein was dissected out without the aid of any anaesthetic, and the patient did not seem to realize that any interference was taking place. When the collapsed vein was incised, one or two drops of dark russet blood escaped from its lumen. A pint of ephedrine-glucose-gum solution was slowly infused into the vein, and ten units of insulin were injected intramuscularly. After the solution had been flowing for about ten minutes vaginal haemorrhage recommenced, so the pack was withdrawn and

* A communication read before the North of England Obstetrical and Gynaecological Society, May 22nd, 1936.

† *Journ. Obstet. and Gynaecol. British Empire*, 1935, xlii, No. 5, 852.

the uterine contents were removed digitally, without any resistance or sign of discomfort on the part of the patient.

On completion of the infusion the excessively rapid radial pulse could be felt, and the patient lazily opened her eyes but did not seem to appreciate her surroundings. The lethargy persisted, but with slight uneasiness, and, as no further improvement took place, one-sixth of a grain of morphine was given, and a transfusion of one pint of citrated blood was commenced three and a half hours later—that is, as soon as a suitable donor could be obtained. Again no anaesthetic was necessary for incising the arm. After this transfusion the patient seemed to realize where she was, and, although cerebration was slow, she could reply to questions, her answer usually being limited to "Yes" or "No." The colour of her lips had improved and her pulse was more readily palpable, but, as there was no evidence of further progress, a second pint of blood was transfused two hours later, as a result of which her condition showed a marked improvement. Directly after the transfusion the patient herself initiated conversation, apologized for having caused so much trouble, and thanked the staff for all they had done for her, saying that she now felt much better.

She made good progress while in hospital, although she had several rigors without localizing evidences or continued pyrexia during her stay, and was sent home eighteen days later with a note for her doctor suggesting a further period of rest and massive doses of iron. She stayed in bed at home for a fortnight, and, on rising, developed oedema of the feet. As a precautionary measure she was kept in bed for another ten days, since when her convalescence has been uneventful. Now her erythrocyte count is 5,200,000, her haemoglobin percentage is 65, and she states she is no worse for her experience.

Commentary

This was a case in which the indications for a blood transfusion were certainly present, yet, had she not been given the emergency infusion of ephedrine-glucose-gum solution, I am satisfied in my own mind that she would not have been alive when the preliminaries for a blood transfusion had been completed. It is a stubborn fact that a timely, life-saving simple infusion is invariably more efficacious than a post-mortem blood transfusion.

Clinical Memoranda

Two Cases of Tetanus Cured by Massive Intravenous Antitoxin

Whereas there is unanimity of opinion in the treatment of tetanus with antitoxin, there still remains considerable lack of agreement as to the best method of administration, also whether a single dose should be given or frequent smaller amounts. Clearly, the appearance of the symptoms of tetanus shows that whatever toxin is in circulation in the blood stream some portion of it must have attacked, and possibly have become adsorbed to, the motor nerve cells. It is in order to neutralize this toxin that the intrathecal route of administration has been advised, and W. H. Park, with M. Nicoll,[1] following work on guinea-pigs, favour this route in preference to the intravenous. H. Florey and P. Fildes,[2] comparing the two routes in rabbits, found that one had no superiority over the other. There is equal diversity of opinion among clinicians.

However, Leslie Cole[3] has recently made a thorough investigation, and from his series of cases it appears that the intravenous route is the more satisfactory; with E. T. C. Spooner he has considered the question of dosage. They have demonstrated that, following the intravenous injection of 200,000 international units, there remain, after fourteen days, between 3 and 5 units of antitoxin per c.cm. of circulating blood, and even after twenty-eight days about 1 unit per c.cm. was still present. It appears, therefore, that in future the antitoxin treatment of tetanus will consist of massive single doses administered intravenously.

The following two cases may be of interest, the treatment being substantially on these lines.

CASE 1

A labourer aged 26 ran a nail through his boot fifteen days before admission to hospital, giving rise to sepsis of toe, first noticed three days later, healing rapidly. Four days before admission to hospital the mouth could not be opened completely; this was followed in two days by stiffness of back. There were no other symptoms.

On admission the following were noted: Risus sardonicus, trismus, tonic rigidity of neck, back, chest, and abdomen. Healed wound on right small toe. Temperature 100°, pulse 112. General condition good.

Immediate treatment: Lumbar puncture; C.S.F. under slight extra pressure; 4,000 int. units A.T.S. given intrathecally, 16,000 intravenously.

Subsequent treatment and progress: Reflex spasms the day after admission, persisting for three days; never severe or frequent. On second day 200,000 units given intravenously, and during the next three days a further 200,000 units were administered by the same route. Temperature and pulse rate had fallen to normal. At the end of ten days trismus and rigidity of neck and back had passed off. Patient was discharged eighteen days after admission, abdominal hypertonus persisting for a further two weeks.

CASE 2

A boy aged 10 cut his leg while playing three weeks before admission, the cut healing with slight suppuration. Three days before admission he complained of inability to open the mouth properly. No other symptoms.

On admission the following were noted: Marked risus sardonicus and trismus. No other tonic rigidity. Small granulating abrasion on right leg. Temperature 100.2°, pulse 124. General condition good.

Immediate treatment: 180,000 int. units A.T.S. given intravenously.

Subsequent treatment and progress: Abdominal hypertonus present the day following admission; 40,000 units given intravenously. Temperature and pulse rate normal on third day. Twelve days after admission trismus had passed off, and abdominal muscle tone was normal. Patient discharged twenty days after admission.

HENRY CANWARDEN,
Assistant Medical Officer, Central Middlesex County Hospital.
Willesden, N.W.10.

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[3] Cole, Leslie, and Spooner, E. T. C.: *Quart. Journ. Med.*, 1935, N.S., iv, 295.

Double Primary Carcinoma of Colon

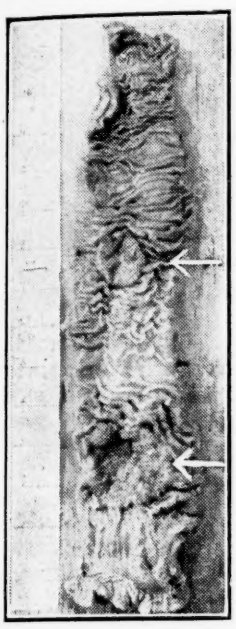
The occurrence of two primary carcinomata simultaneously in different organs of the body is uncommon, but by no means rare. Major, in 1919, collected 628 such cases recorded up to that date, but in by far the majority of these the lesions were found neither in the same structures nor at the same time.

Two or more primary malignant growths, however—if rodent ulcers are excluded—present at the same time and in the same organ are rare enough, I think, to be worthy of record. Abel, in 1929, reported three cases of two separate and distinct carcinomata of the large bowel present at the same time. In the discussion following Norbury's paper at the Royal Society of Medicine in 1930 Lockhart-Mummery recorded five cases of double carcinomata in the large intestine, but these were not all simultaneous; two cases were reported from St. Bartholomew's Hospital and two from St. Thomas's Hospital.

CASE REPORT

A male patient, aged 52 years, was sent to me in April, 1935, complaining of diarrhoea together with the passage of blood and mucus. These symptoms had been present for one month, and were not accompanied by any pain. He had had a short attack of diarrhoea in September, 1934, but this had lasted only a few days, had been unaccompanied by blood or mucus, and had been followed by complete recovery. I found his general condition to be good, with no recent loss of weight or appetite. Nothing abnormal was seen on examining the abdomen, but on rectal examination a hard, craggy, bleeding ulcer was found on the posterior rectal wall about three inches above the anus. This extended about half-way round the bowel, and was quite freely movable.

The patient was admitted in the course of a few days, and laparotomy was performed through a right paramedian sub-umbilical incision. No signs of secondary growth and no evidence of extension beyond the bowel wall were found. A left inguinal colostomy was done. After fourteen days the second stage was carried out, the usual abdomino-perineal excision being performed. The patient recovered well, and was up in a chair on the fifteenth day.



PATHOLOGICAL REPORT

On examining the specimen removed, the gut was found to be about fourteen inches in length, and two ulcers were present.

1. The first, centred about three inches from the anus, was two and a half inches in diameter, and had a hard, everted, circular margin. At one point on the edge was a small, hard polypoid nodule, one-third of an inch in diameter.

2. A second circular ulcer, one and a half inches in diameter and similar to the first, was present about eight and a half inches from the anus.

These two ulcers were both typical carcinomata, the lower one being obviously of greater age than the upper. The intervening and surrounding mucous membrane of the rectum and colon showed no sign of either polyposis or other abnormality.

The microscopical report (by Dr. Proger) is as follows:

"Sections of the distal ulcer show a columnar-celled adeno-carcinoma with infiltration of the whole thickness of the gut wall. Sections of the adjacent fibro-fatty tissue show deposits of a similar new growth in small veins. The proximal ulcer shows similar but less extensive new growth."

COMMENTARY

The first point of interest is that two entirely separate and distinct primary carcinomata were present. They were both of comparatively recent origin, and one would have expected some evidence of polypi, even if these were found in a state of retrogression.

The second point of interest is that if a perineal excision had been performed instead of an abdomino-perineal the proximal malignant ulcer would have been left behind; I do not think it would have been possible to remove ten inches of bowel by a perineal excision in this particular case. One wonders if, in occasional cases, "recurrences" are ever due to the overlooking of a second carcinoma higher up in the bowel.

My best thanks are due to Mr. B. Schulenberg, lately resident surgical officer at St. Bartholomew's Hospital, Rochester; and to Dr. L. W. Proger of the Royal College of Surgeons for his help with regard to the sections.

Rochester. ERIC J. GREENWOOD, M.B., F.R.C.S.

Reviews

A RECENT HANDBOOK ON MALARIA

Malaria: its Clinical Study, Parasitology, and Control,[1] by NOCHT and MAYER, is a second and enlarged edition of a small handbook on malaria issued in 1918 as a result of the need felt, in connexion with courses and lectures in tropical medicine at the Hamburg Institut für Schiffs- und Tropenkrankheiten, for a short, concise account of the disease. Such a purpose the present publication admirably fulfils, the more so as it is up to date in various recent developments in malariology which it might be difficult for the ordinary reader without guidance to gather from the very extensive literature. The book, however, is more than an elementary guide to the student, for as a very conscientious and complete, though condensed, account, covering a considerable field of malaria study, it should also be a useful book of reference to those actively engaged in malaria work. Perhaps its chief interest to many will be the section dealing with treatment, including as it does not only a careful summary of the principles of quinine treatment, with short but helpful references to the use of certain quinine derivatives, but a very full account of treatment by the new synthetic drugs (atebrin nine pages, plasmoquine four pages), as also various combined treatments, which are severally discussed.

After a section dealing with the clinical aspects of malaria there follows—quite appropriately in a book on this disease—a section devoted to that important sequel of malaria, blackwater fever, and its treatment. There are short sections on induced malaria, on chemical examination of the blood and urine with tests for quinine and atebrin, sections on pathological anatomy, personal and mass prophylaxis, on immunity, epidemiology, technique of blood staining, and other subjects, including a short account of the leucocytes in malaria, other blood changes and serology, and a reference to Henry's reaction. The book ends with sections dealing respectively with the parasites (four species, including *P. ovale*) and with the "carrier," the methods of control against which are usefully summarized. Bibliographies have been purposely omitted for reasons of space, and references in the text do not usually give more information than the author's name. Short references are, however, fully given in certain special cases. It is perhaps open to consideration whether in a subsequent edition more such selected references, even at the cost of extra space, might not be found very helpful by the many readers who are likely to turn to this publication for information.

PHARMACOLOGY OF ANAESTHETICS AND NARCOTICS

The second of the supplementary volumes of Heffter's Textbook of Experimental Pharmacology[2] is devoted to aliphatic narcotics. The author, Professor M. KOCHMANN, dealt with part of this subject in the first volume of the original textbook in 1923. The present volume is of 283 pages and is provided with a separate index, which is a great convenience for its use as a work of reference. The author deals in turn with the anaesthetics, hypnotics, and alcohol. The volume is essentially one of reference, and provides a complete account of the very large amount of research work that has been carried out recently on anaesthetics and hypnotics. Most of the space in the

[1] *Die Malaria. Eine Einfuhrung in ihre Klinik, Parasitologie und Bekampfung.* By Prof. Bernhard Nocht and Prof. Martin Mayer. Berlin: Julius Springer. 1936. (Pp. 172; 24 figures. RM. 15.60.)

[2] *Handbuch der Experimentellen Pharmakologie.* Edited by W. Heubner and J. Schuller. Vol. ii: *Narkotica der Fettreihe.* By M. Kochmann. Berlin: J. Springer. 1936. (Pp. 283; 29 figures. RM. 36.)

section on anaesthetics is devoted to ether, chloroform, and nitrous oxide, but an account is also given of the newer gases—namely, acetylene, ethylene, and cyclopropane. Half the section on hypnotics is occupied by the barbiturates, which is an interesting indication of the growing importance of this group.

In the section on alcohol the most interesting feature is an account of recent work done chiefly in America and Sweden on the estimation of blood-alcohol and the relation between the alcohol content of the blood and the intensity of intoxication. In general the author has given a very competent summary of a large field of research work, and the volume constitutes the most complete standard work of reference on its subject that is at present available.

DIAGNOSIS OF PELVIC VARIATIONS

Under the somewhat infelicitous title of *The Obstetric Pelvis*,[3] Dr. HERBERT THOMS of New Haven, Connecticut, has made a careful study of the female pelvis, with especial regard to the occurrence of variations in its form and dimensions. The general attitude of the author towards his subject may best be indicated by two or three quotations from the book. "It is the purpose here to emphasize the great importance of a fundamental knowledge of the mechanism of labour." "There is little question that a large proportion of ill-advised obstetrical operations are due solely to a lack of proper understanding of the mechanical aspects of labour." "The use of the so-called *test of labour* as a substitute for scientific diagnosis is a most dangerous policy." As a natural corollary to this attitude the author takes a deep interest in roentgenometric pelvic diagnosis, a subject which he has done much to develop in his own clinic, and he asserts that "roentgen pelvimetry should form part of the prenatal examination of every primiparous woman." These statements form a series of highly contentious propositions, and they excite the reader to approach the author's development of the subject in a critical frame of mind.

After a short but clear account of the development and general anatomical characters of the female pelvis, Dr. Thoms describes the method he has himself developed of exact mensuration, by *x*-ray photography, of the upper pelvic strait. He claims that the method can be carried out without the assistance of a radiologist, and that there are no difficulties in interpretation of the photographs which the clinical obstetrician cannot himself deal with. By the use of this method he has discovered three main types of pelvic "variation"—the female type, the round type, and the anthropoid type. Each type may be further classified as large, average, or small, in accordance with the length of the antero-posterior diameter. Included among these variations is the pelvis usually described as "round" or "generally contracted"; the more marked departures from the normal, such as the funnel pelvis, the rachitic pelvis, etc., constitute a group entirely different in significance from the variations. Foetal cephalometry *in utero* the author regards as being useful mainly in determining foetal maturity, and he has endeavoured to work out a relation between the length of the occipito-frontal diameter and the weight of the foetus.

The reader who desires to apply the proof of the pudding to Dr. Thoms's propositions will turn with interest to the chapter entitled "Pelvic Variation and the Course of Labour." The chapter deals with a series of 100 primiparous cases in which the existence of variations had been precisely determined by the author's method. Admittedly these cases are too few to justify broad conclusions, but two points of interest emerge: (1) occipito-posterior engagement of the head appeared to be more frequent in the "average round type" than in any other; and (2) the duration of labour appeared to be longer in the round type series as a whole than in the others. In all, 24 per cent. of the series of 100 cases were dealt with by operative delivery, a proportion so high as to suggest that roentgenometric pelvic diagnosis does not make the conduct of labour in primiparae an easier task.

Improvements in methods of obstetrical diagnosis will always meet with a sympathetic reception in the expectation that they may prove to be of practical value, and we hope that Dr. Thoms will continue his work until he is in a position to demonstrate clearly that the recognition of pelvic variations is a matter of practical importance. In order to attain this end a good deal of work still lies before him. Short descriptions, with excellent illustrations, are given of the gross forms of pelvic deformity, and these are followed by a brief chapter on the diagnosis of disproportion. The usual clinical methods are described and emphasis is laid upon their inadequacy, the author's opinion being that "to treat doubtful cases of disproportion without proper roentgenological diagnosis is as culpable as to treat fractures without the aid of the same diagnostic means."

THE THEORY OF EMULSIONS

CLAYTON'S *Theory of Emulsions and Their Technical Treatment*[4] is in the form of a compendium of the researches hitherto published on emulsions, garnished with a discussion of the conclusions reached by various workers. Many researches have been made with a view to elucidating the conditions existing between the emulsified substance and the liquid in which it is suspended, and many types of emulsions have been thus studied, but notwithstanding the large amount of information obtained from the work done there yet exists a certain lack of uniformity among the ideas formulated to explain some of the properties of emulsions. Work yet remains to be done to clarify the conditions of intermolecular relationship between the surfaces of the media concerned, and it would appear that the work that is to crown what has already been done will need to explore a line of research not hitherto successfully attempted. Clayton's book provides the basis for such further research by showing how the facts hitherto revealed have been established and how they are related to each other. These facts are not only important in regard to theoretical considerations, but are of immediate practical value in technology and industry. The history of their discovery, the discussion of their heuristic consequences, and the description of the methods by which their principles are utilized for industrial application, form the substance of the book. The book is for this reason exceedingly valuable as a volume of reference, for hardly anything is omitted of published work that relates to the subject-matter.

Some seventy or eighty emulsifying agents are mentioned and their effects and uses are described, and the emulsions that receive attention relate to such diversified matters as leather, wool, agriculture, dairying, and road asphalt, besides many articles of individual peculiarity such as mayonnaise. Reference is also made to the successful use of emulsions of oil by subcutaneous and intravenous injection, for the removal by adsorption of toxins in the blood. A detailed description is given, with illustrations, of the more important machines used for

[3] *The Obstetric Pelvis*. By Herbert Thoms, M.D., F.A.C.S. Baltimore: Williams and Wilkins Company; London: Baillière, Tindall and Cox. (Pp. 128; 50 figures. 11s. 6d.)

[4] *The Theory of Emulsions and Their Technical Treatment*. By William Clayton, D.Sc., F.I.C. Third edition. London: J. and A. Churchill Ltd. (Pp. 202. 12s. 6d. net.)

scientific and industrial purposes having relation to emulsions. A great number of people have an interest in the study of one or other aspect of some kind of emulsion, and to all these the book cannot fail to be valuable.

MIND AND MECHANISM

In a short book of some one hundred and fifty pages of actual reading matter in which the print is admirably spaced, entitled *Mechanistic Biology and Animal Behaviour*,[5] Mr. THEODORE H. SAVORY has given a very clear, simple, and interesting account of the way in which the behaviour of certain classes of animals may be expounded, and to a large extent explained, on the mechanistic basis and on the assumption that it consists purely of reactions of a physico-chemical character and does not require the postulate that they possess anything at all in the nature of a mind. This " point of view " of the author is defined in his first chapter, so that there shall be no mistaking it. Its propriety is upheld throughout dogmatically and almost without qualification, and the rest of the book is directed to its demonstration and justification. Reflexes, the various tropisms, hormones, instincts, habits, are passed under review ; their influence upon behaviour is traced ; and it is contended that they are all clearly explicable in purely mechanistic terms. All this is done in an extraordinarily able and fascinating fashion. It is held that the thesis is completely demonstrated with regard to reflexes and tropisms ; that it is even now demonstrable with regard to instincts ; that it may safely be assumed in the case of habits ; and that the course of biological history justifies the faith that, as gaps in the knowledge of other animal actions are filled by future researches, any lack of proof that the thesis is universally true will surely be forthcoming. " The mechanist is therefore the only scientific biologist," and the holders of any alternative biological theory may well be scorned or ridiculed.

All this is very uncompromising, and the success, as distinct from the interest, of the author's demonstration will probably not be admitted by even the majority of his readers. There can be no doubt of the extent of his claim. He sets in the forefront this quotation from Sir P. Chalmers Mitchell: " If we scrutinize our generalizations, and do not extend them to a class of facts from which they were not derived, if we do not endow abstractions with an independent reality, we shall find no logical ground to infer the existence of any but physical events in the world of living things " ; and he says with his own pen that " the only safe thing to do was to regard the animal merely as a physical object affected solely by external stimuli, and no more." The emphasis must be placed on the last three words and on the application to the whole of animal creation. The only real exception which the author allows is the human species. He does even this incidentally and (so to speak) surreptitiously, and, of course, it places him in a dilemma which he completely shirks. It is true that he reluctantly allows that the hypothesis that " those animals which we customarily call higher " may have a mind is useful, but he ignores the bearing that this may have upon the proposition that those which are lower may possess the rudiments of something akin. The dog and the fish are just mentioned in the book: otherwise illustrations are drawn wholly from the invertebrates, and especially from the arachnids, towards the study of which Mr. Savory has contributed so greatly. This is wise, and would have been quite legitimate if the general proposition had been limited to this portion of the animal kingdom only. It is never so limited, however ; and even in this field it is difficult to accept the contention that in the influence of reflexes, tropisms, and instincts on animal behaviour there cannot arise some sense of awareness, or even some sense of need, even if we allow no sense of purpose. If the existence of " mind " may (or must) be admitted anywhere in the animal kingdom, the principle of parsimony does not forbid its being postulated as an explanation of behaviour even in relatively lowly organisms as a supplement to purely physico-chemical reaction, even if it may arise out of this.

Those who require something in the nature of an antidote to this kind of reasoning may be directed to a volume entitled *The Natural History of Mind*,[6] by Mr. A. D. RITCHIE, lecturer in chemical physiology in the Victoria University of Manchester. It is quite a different kind of book, longer and a little more difficult to read and follow, but in its own way equally interesting and spiced throughout with a dry wit and delicate irony, which add to the reader's zest. It is a reproduction, with some amplification, of the Tarner Lectures delivered in Trinity College, Cambridge, last year, and is an important book, which should not be overlooked by anyone interested in psychology and its relations with both philosophy and physiology. Its general character may be indicated by saying that the first three chapters (67 pages) are given up to considerations arising out of physics and biology needed to clear the ground ; the next two chapters (70 pages) to an account of the most recent physiology of the nervous system ; and the remainder (just over half the volume) to the nature and scope of psychology and the processes of sensation, perception, cognition, emotion, and thought from the point of view adopted by the author. There is thus room for the discussion of a great variety of interesting problems, and among these will be found the vitalistic and mechanistic theories, causation, teleology, and the relation of organism to environment, the psycho-analytic method, symbolism and imagery, the nature of language, and the scope and limitations of intelligence tests, all from a somewhat novel standpoint. With reference to mechanists and behaviourists he concludes:

" Their mistake has been not only to use an entirely inadequate physiology but to wear blinkers so that none of the specifically human aspects of behaviour were visible to them. . . . The most central and illuminating fact about mental life is not consciousness but freedom . . . The conception of freedom is difficult, and it is easy to talk nonsense about it, but to deny it is inevitably to talk nonsense. . . . Unless you accept freedom as an initial postulate it is no use talking about mind or trying to distinguish the higher from the lower among living organisms, or even talking about organisms at all. None of these would be distinguishable but for their display of something like spontaneity, initiative, or choice as far as their limitations permit."

Notes on Books

We welcome a second edition of Mr. J. B. MACALPINE'S excellent monograph on cystoscopy.[7] It is, however, more than a fresh edition, being practically a new work. A section, comprising some eighty pages, on urography has been added, for which reason the title of the book has been altered. New chapters on fistulae of the bladder, on changes in the bladder neck, and on congenital abnormalities of the kidney have been added. At the same time, owing to judicious compression and rearrangement of the matter, the size of the book has not been materially increased. In a work of this nature much depends on the illustrations. The number of colour plates has been

[5] *Mechanistic Biology and Animal Behaviour*. By Theodore H. Savory, M.A. London: Watts and Co. 1936. (Pp. 182 ; 7 figures. 7s. 6d. net.)

[6] *The Natural History of Mind*. By A. D. Ritchie, M.A. London: Longmans, Green and Co. 1936. (Pp. 286. 15s. net.)

[7] *Cystoscopy and Urography*. By J. R. Macalpine, F.R.C.S. Second edition, revised and enlarged. Bristol: John Wright and Sons Ltd. London: Simpkin Marshall Ltd. 1936. (Pp. 478 ; 297 figures ; 14 coloured plates. 30s. net.)

increased from twelve to fourteen, and all of them are excellent. About 140 new illustrations have been inserted in the text. Most of these are line drawings, and are self-explanatory, but a few of the tracings of pyelograms are not so clear as they might be. On the whole, the book is to be recommended. It is a clearly written account of the subject, and will undoubtedly prove useful, especially to those who are comparatively inexperienced and need a reliable guide.

The third edition of Dr. L. F. HEWITT's monograph *Oxidation-Reduction Potentials in Bacteriology and Biochemistry* was reviewed at some length in the *Journal* of September 7th, 1935 (p. 465). A fourth edition[s] has now appeared. The interest taken in this subject is now very general, and there are few branches of biology into which potential measurements have not penetrated. Hence Dr. Hewitt finds a considerable volume of new work to report, with a corresponding increase in the size of the bibliography.

[s] L.C.C. *Oxidation-Reduction Potentials in Bacteriology and Biochemistry*. By L. F. Hewitt, Ph.D., B.Sc., F.I.C. Fourth edition. London: P. S. King and Son, Ltd. (2s.)

Preparations and Appliances

A NEW OXYGEN TENT

This apparatus, British made throughout, is an adaptation of a type in general use in the United States and Canada. The claims for it have been verified in London hospitals, and certain important improvements made. It is constructed upon what is known as the "open top" principle—that is, that when oxygen, which is slightly heavier than air (and cold oxygen is heavier than warm oxygen), is introduced at a reasonable speed into the tent, open at the top, there is maintained in the lower part an atmosphere rich in oxygen, in spite of free diffusion upwards. From the cylinder the oxygen passes through an ice-box (see Fig. 1), thus providing a gentle circulation of cool air; excessive humidity is avoided and the expired air passes out of the top. A flow of 4 litres a minute gives a 50 per cent. concentration, 5 litres 60 per cent., and so on. Thus the operating costs working on a 5-litre

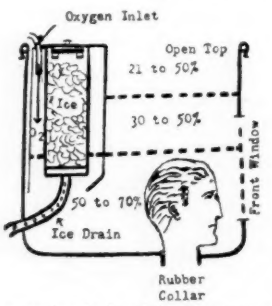


FIG. 1.—Showing patient's head in the tent and the position of the ice-box.

flow would be less than tenpence an hour with a 100-foot cylinder (2,800 litres), or 1s. 3d. an hour with the 40-foot cylinder.

The apparatus is not only suitable for adults, but is ideal for infants and children. For adults the head only is placed within the tent, so that interference with efficient nursing is reduced to a minimum. There are no intricate parts about the apparatus, which is quite simple to work. The ordinary regulator with flowmeter gauge is used. From the accompanying illustration it will be seen that the apparatus can easily be taken apart for storage or transport, thus enabling the administration of oxygen by the most efficient and economical method in the patient's own home.

The Standard.—Into the metal base (A), which has been specially designed to run well under the bed, is fitted a hollow tube (B), and into this a solid metal rod (C). The screw-bolt (D) enables the rod to be raised or lowered at will. At its highest point the opening into which the head of the patient is placed is 5 feet from the floor, and at its lowest 26 inches from the floor, thus accommodating anything from a baby's cot to a 6-foot man sitting up in bed. At the top of the standard is fixed an arm (E), to which the tent itself (F) is attached and suspended by four steel chains (G). The handle (H) enables the tent to be adjusted horizontally or vertically, or be tilted to any angle. To these suspension chains is slung a metal frame, to which the hood or tent itself is attached. A special standard, eliminating the upright and arm as shown in Fig. 2, has been devised whereby the apparatus may be attached to any ordinary stretcher.

The Hood.—This is made in various materials. It is fuller at the top than at the bottom. At the lower end of the front is an adjustable collar made of soft velvet rubber (I). Non-inflammable windows (J) are let into the front and sides. A rubber tube is fixed into one side of the hood below the window and on a level with the position in which the mouth

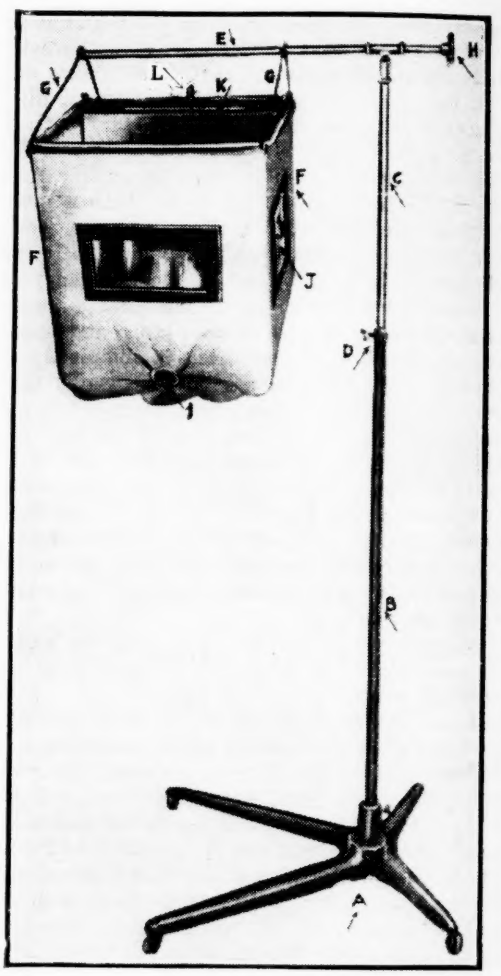


FIG. 2.

of the patient should be. This tube permits the taking of a sample of the air within the tent in order to check the concentration.

The Ice-box.—Excessive humidity is removed by the passage of the oxygen through ice. The ice-box (K) is fixed on to two hangers forming part of the hood frame. It is important to note that the hood should be fixed on to the frame before the ice-box is placed in position. A stout wire basket within the ice-box receives the ice, so that the breath of the patient never comes into contact with the actual container. For this reason 6 lb. of ice will last for four hours. From the cylinder the oxygen goes through a rubber tube into a bent metal pipe (L) and, passing through the ice, surrounds the head of the patient. A rubber runaway pipe for melted ice is fixed in the bottom of the box.

The price complete (but exclusive of regulator and flowmeter gauge, with which many hospitals are already equipped) is £18. The apparatus is fully protected.

The tent is at present undergoing clinical and laboratory tests at St. George's Hospital, Hyde Park Corner, London, S.W.1, the results of which will shortly be published.

British Medical Journal

SATURDAY, SEPTEMBER 12th, 1936

EVOLUTIONARY PROGRESS

There must have been some in the audience which listened to Dr. Julian Huxley, as he expounded the latest from the field of evolution to the Zoological Section of the British Association at Blackpool, who had sat at the feet of his grandfather—the great Huxley—and heard him debate the same subject in Victorian times. Their hearts must have warmed to him as he championed the cause of Selection, both natural and unnatural. Like Darwin, he holds that Selection is the most important and most effective means of bringing about evolutionary changes among living things. Selection has been under a cloud for a generation or more; the address of the president of the Zoological Section will do much to dispel that cloud. The senior members of the Section must have been struck, too, by the fact that the younger Huxley dealt with two worlds, while the elder Huxley confined his attention to only one of them. The evolutionary world of Darwin and of the elder Huxley was one beheld by the naked eye, the world revealed by the study of living things as they now are or as they were in the geological past. The other world, which they knew nothing of and which we are only now exploring, is that revealed by the microscope in the nucleus of the fertilized egg. Throughout his address Dr. Julian Huxley flitted from one world to the other on easy wing, supporting his argument by facts chosen from each. To the modern evolutionist the world of the nucleus—the abode of chromosomes and of genes—is the more important of the two. It is true that there was a time when the nuclear world was also under a cloud. Some twenty years ago or more, in the time of Dr. William Bateson, the protagonist of Mendel, the nucleus was supposed to be little better than an old clothes shop: it was then supposed that all the garments which were parted as the nucleus divided were of established patterns; no fresh designs were supposed to be introduced; new fashions were never invented. That attitude towards the nuclear world has vanished. In his address we find the president of the Zoological Section speaking of the germinal nucleus as if it were a factory where old designs could be modified and entirely new fashions introduced.

"Mutation," in this address, takes on an enlarged significance. In the past it has been applied to any big and sudden change in structure—a jump—such as is seen in the production of achondroplastic and of hornless breeds of cattle. The elder Huxley believed that a new species might be formed at one step or jump, by mutation. Darwin, on the other hand, clung to his own idea that new species came into existence gradually and slowly by the accretion of minute degrees of variation. The younger Huxley seeks to reconcile these two opinions, and uses "mutation" as a term to cover all degrees of variation—the big ones his grandfather had in mind and the minute ones on which Darwin built his theory. Mutations, in this sense, are being constantly produced in the nuclear world, some useful, some harmful, some neither the one nor the other. Such mutations or variations are the material on which Selection acts and thus plays its part in the evolutionary process.

The more the nuclear world is studied the more complex becomes its constitution. The number of genes which crowd its chromosomes must be infinite in number and in complexity. The genes of the nuclear world, it now appears, are subject to the law of struggle, competition, and survival; the chromosome, as well as the jungle, if we are to follow Dr. Julian Huxley in this matter, is subject to the law of selection. He spoke of the "gene-complex" as an "elaborately co-ordinated system." The genes work in teams; if a gene fails in its duty others seek to compensate for its failure. It does now seem as if the genes of the geneticist are just as full of "units" as the atoms of the chemist are full of electrons. Presently it will be found necessary to resort to some form of quantum hypothesis if all the facts of development and of evolution are to be fully accounted for.

It was but right that in his address Dr. Julian Huxley should touch on a problem to which he has given particular attention. In the development of the body every structure is timed to begin at a certain phase and every organ or part is "tuned" to proceed in its growth at a definite rate. There must be an infinite number of mechanisms—perhaps hormones—which serve as pace-makers. There is no doubt that such pace-makers have played their part in the evolution of the human body. Many of man's special characters—such as the comparative hairlessness of his skin—are the result of foetalization, of the persistence of a stage which was originally foetal. The process may proceed so far that the adult stage is no longer reached. Changes effected in this way exemplify a form of evolution which Dr. de Beer of Oxford has given the term "clandestine." To explain the acceleration or retardation of developmental processes Dr. Julian Huxley has postulated the existence of "rate-factors," or genes which can influence the rate of growth, up or down. The help which such a theory provides is apparent rather than real.

There is noticeable in this address an ethical attitude of mind which has not hitherto found a place in scientific statements. Scientific men of an older generation, in making and publishing their discoveries, were concerned only with the reliability of their observations and statements. The immediate or ultimate effect of their discoveries on human behaviour or on civilization they did not concern themselves with. There has lately appeared in certain scientific circles an attitude of mind which holds that a discoverer has an ethical or moral

responsibility as well as a scientific one. It seems somewhat hard to hold a zoologist or an anthropologist responsible for principles which he has discovered to be employed by Nature in producing evolutionary effects. Nevertheless Darwin has been accused of paving the way that led to the great war. The president of the Zoological Section at Blackpool left his audience in no doubt as to the view taken by him on the ethical issue. Competition and Selection, although potent in the realm of Nature, he held to be immoral when applied to the human world. "Natural Selection," he exclaimed, "is efficient in its way—at the price of extreme slowness and extreme cruelty. . . . But it is blind and mechanical. . . . For the statesman or eugenist to copy its methods is both foolish and wicked."

While admitting that man, under the action of natural evolutionary processes, had risen to his unique position in the animal kingdom, he held that henceforward mankind must control its own further evolutionary progress. Selection must go on, but it must be "man-controlled." Dr. Julian Huxley would breed for brain, yet the fact is patent to all that men and women with great qualities of brain are often very unhappy. It is just when the eugenist begins his task of selecting his stock types that his real difficulties begin. Short of an absolute dictatorship such an ideal seems at present beyond our grasp.

THE PINEAL BODY AS AN ENDOCRINE GLAND

Consideration of the structure of the pineal body and comparison with those general characteristics which are found in endocrine organs seem to argue against any primary endocrine function of this small body. It develops as an outgrowth from the roof of the diencephalon and is at first composed entirely of ependymal cells; later, mesodermal elements become included, but even in the state of full development it consists mainly of ependymal cells scattered in a sort of matrix of neuroglia and connective tissue. The evidence on purely histological grounds of an endocrine function is not convincing, nor is the description of special pineal cells with various inclusions of pigment and mitochondria and possessing different sorts of nuclei. It must, however, be pointed out that Tilney and Warren demonstrated glandular cells in the prenatal pineal. In the hands of a considerable number of experienced operators pinealectomy in the rat, rabbit, dog, and chick has yielded only negative results. When positive results have been reported the claim has been that ablation of the pineal leads to premature development of the secondary sex characters in the male, enlargement of the gonads, overgrowth, and obesity—that is, a picture not unlike that of the clinical one of macrogenitosomia (pubertas praecox). Here again the evidence is not clear-cut, and is not in harmony with more recent results obtained with pineal extracts.

The confusion obtaining in this interesting field is well illustrated by the fact that, whereas certain workers attribute the "endocrine" manifestations of tumours of the pineal body to hyperfunction of the "gland," others put them down to hypofunction. That the clinical picture, pubertas praecox, occurs in cases of pineal tumour has frequently been reported in prepubertal subjects, but it has also been found in cases of tumours in regions remote from the pineal (for example, floor of the third ventricle, testes, adrenal). The exact diagnosis of a pineal tumour can probably be made only by operation, but the association of the signs of macrogenitosomia with signs of cerebral tumour, especially loss of pupillary reaction to light and restriction of upward movement of the eyeball, should make a provisional diagnosis possible, which may be partly confirmed by a ventriculogram. In the case of a pineal tumour there will be dilated ventricles (lateral and third) and a shadow of the tumour may be recognizable. In adult subjects the signs of a pineal tumour will not include those of pubertas praecox, but the *x*-ray findings and eye symptoms will be guides. Horrax, who has made important clinical contributions to our knowledge of these tumours, has recently reported two cases,[1] one in an adult woman and one in a boy of 10 years. Extraordinary improvement was achieved in the former by decompression and later by incision of the cortex down to the lateral ventricle: one pole of the tumour could be exposed and removed and some of the remainder removed by suction. In the latter case, which presented the classical picture of pubertas praecox, decompression led to a marked re-establishment of a youthful appearance. In both cases valuable therapeutic aid was obtained from high-tension *x* rays, but in the pubertas praecox case not to so great or lasting an extent as in the adult. Horrax finds it difficult to support the view that the pineal is an endocrine organ, and offers no explanation of the mechanism by which the syndrome of pubertas praecox may be brought about.

When we turn for more recent evidence on the experimental side, we find the striking effects of pineal extracts which have been demonstrated by Hanson and his co-workers.[2] These effects must be considered in relation to results obtained by these workers with extracts of the thymus gland. The technique for the demonstration of activity of both pineal and thymus extracts is different from that used for any other hormone, in that the injections of the presumed active hormone have to be continued through several generations of animals. The rats used by Hanson and his colleagues to test thymus extracts were, in the first group—that is, the progenitors in any one experiment—injected on the fortieth to sixtieth day of life: subsequent generations were treated on the sixteenth to twenty-fifth day—that is, before puberty. This was continued through some nine or ten generations, the injection being 1 c.cm. of extract intraperitoneally daily. The results were striking and can be summed

[1] *Arch. Neurol. and Psychiatry*, 1936, xxxv, 215.
[2] *Journ. Amer. Med. Assoc.*, February 1st, 1936, p. 370.

up shortly by the statement that in succeeding generations there was a progressive acceleration in development of size and sexual maturity. Thus the rats of the ninth generation showed a growth of hair on the first day, whereas normally this occurs on the twelfth to sixteenth day. Testes descended and vagina opened in a few days, whereas in controls these events happened only after periods of about forty to sixty days respectively. The "thymus" rats became pregnant after twenty-two days of life, and litters were obtained after forty-three days of life, compared with the usual average periods of eighty and 102 days respectively in the normal animal. Adequate controls were injected with extracts of other tissues, and it was also demonstrated that removal of the thymus in successive generations of white rats led to retardation of growth and development. Similar experiments with suitable pineal extracts led to sexual precocity associated with marked dwarfism instead of with overdevelopment as in the thymus-treated generations. These results have been confirmed, and it would seem that a strong case has been made for a pineal hormone or hormones. The discrepancy between these findings and those reported after removal of the pineal is clear and not as yet capable of explanation. The necessity to continue these injections through several generations in order to establish fully the precocious sexual development may provide the key to these remarkable results: but it seems likely that the pineal will soon be given its place among the endocrines.

TYPHOID FEVER OUTBREAK AT BOURNEMOUTH

Yet another outbreak of an infectious fever, this time of typhoid, is recorded and openly attributed to a milk supply which had not been pasteurized. The scene of the outbreak is Bournemouth and the neighbouring towns of Poole and Christchurch. The total number of notified cases up to the morning of September 4th were Bournemouth 222, Poole 143, and Christchurch 20, with six deaths in Bournemouth and one in Poole. The first cases were notified by Bournemouth practitioners on August 21st as presenting symptoms of enteric fever. The medical officers of Bournemouth and Poole at once consulted with Dr. Vernon Shaw of the Ministry of Health, and it was quickly established that the infection arose from milk which had not been pasteurized. Steps were immediately taken to secure pasteurization of the supply in question, and since August 22nd this has been effectively carried out. Additional hospital accommodation has had to be provided by the Bournemouth authorities, and this has been achieved by taking over a large house north of the borough called Haddon Hill. Dr. W. Asten, chairman of the Public Health Committee, stated at a meeting of the Borough Council on September 1st that notifications were fewer daily, and everything pointed to the fact that the worst was over. There was, he said, no further cause for fear or alarm to residents, visitors, or intending visitors, and not the slightest ground for the rumours current in the town that sea-bathing was connected with the outbreak. This, briefly, is the history of the outbreak and of the efficient steps taken by the local medical officers and Public Health Committee to stamp it out as quickly as possible. It is not difficult to sympathize with Bournemouth in the occurrence of such an event during the chief holiday month of the year, but, as we have repeatedly pointed out in these columns, such epidemics will continue to occur from time to time so long as raw milk is sold to the public without effective pasteurization. It is considerably less than two years since an outbreak of scarlet fever at Denham, Bucks, was found to be due to the consumption of milk which had been neither pasteurized nor boiled, the source of the infection being traced to a milker at a farm supplying the dairy. The last figures we received with regard to that outbreak were ninety cases with two deaths. How much longer is the public to be exhorted in large-scale advertisements and in the daily press to drink more milk and yet to be supplied with a grade of milk which cannot in any sense be regarded as safe for human consumption? This latest outbreak at Bournemouth will lend further support to those who hold that all milk, whatever its grade, should be pasteurized or boiled before use.

PATHOGEN-SELECTIVE CULTURES

In the investigation of chronic infections not of a specific nature, it is sometimes difficult to identify the causal micro-organism. Material from any exposed surface, from any part of the alimentary tract, or from the upper air passages, usually contains a variety of bacteria, and to sift the grain from the chaff requires an intimate knowledge of the normal flora of the body, the application of appropriate methods, and unbiased judgement of their results. In this difficult province of clinical pathology it is not unnatural that attempts should have been made to short-cut the laborious process of arriving at a conclusion by orthodox means, and we have seen in consequence a series of criteria set up, by each of which it has been said that the causal micro-organism can be identified. Thus the mere fact that a micro-organism is haemolytic or fails to ferment lactose is sometimes adduced as evidence of pathogenicity, a type of argument which seldom holds water. Perhaps the most plausible of all these methods of approach is the so-called "pathogen-selective" method of culture, which consists simply in cultivating the material to be investigated in the patient's own blood. The usual result of this proceeding is that only one of several bacteria in the material grows, and its capacity for such growth is translated into capacity for tissue invasion, the remaining bacteria by the same argument being regarded as harmless. The advocates of this method take no account of the fact that whole blood, apart from any specific resistance and susceptibility possessed by the patient from whom it comes, is a peculiar type of culture medium, the bulk of its available nutriment being in the form of protein, and not all bacteria being equally capable of multiplying in it. To employ it for the cultivation of material which may contain a mixture of almost any bacteria whatever is a very different thing from judging by this means the varying susceptibility of different individuals to infec-

tion by a single micro-organism, as in Heist and Solis-Cohen's original work on the meningococcus. The dramatic termination of this work in the death of Heist himself from meningococcal meningitis, after it had been shown repeatedly that his blood permitted exceptionally free growth even of carrier strains of meningococcus, may well have left an impression on the minds of his colleagues which nothing can efface. The latest contribution to the subject of the pathogen-selective method is by Solis-Cohen himself,[1] and records the results of applying it to the study of urinary infections. In a number of instances cultures in the patient's blood yielded a different micro-organism from that growing in an artificial culture medium, but since this was also a fluid medium which might well favour growth of some bacteria more than that of others irrespective of their original numbers, it is impossible to judge which is likely to have been the infecting agent by the more usual and reasonable criterion of numerical preponderance in the urine itself. A large proportion of cultures made in blood, some from cases without urinary infection, grew staphylococci, and it is not unduly sceptical to point out that twenty years ago Wright coined the term "serophyte" for bacteria (including the staphylococcus) possessing a capacity for growth in fresh serum which is denied to other bacteria; this distinction is obviously dependent on nutritional requirements and has nothing to do with degrees of pathogenicity. The claims of this method, indiscriminately applied as it is to-day, are not proven, and those interested in it would do well to inquire more critically into the mechanisms which determine its results.

THE SYNDROME OF RESPONSE TO INJURY

It is a commonplace of emergency work that the general reaction of the patient to the injury is as important as, and often more so than, the specific part which has suffered. The whole phenomenon of shock is entirely non-specific, and may reasonably be regarded as a homoeostatic reaction on the part of the organism. Although the humoral theory (that is, histamine theory) of shock has been questioned in recent years there can be little doubt that in certain respects it is very satisfactory. The position in regard to the reaction to non-specific nocuous agents is examined in some detail by H. Selye,[2] who considers that the reaction of animals (rats) to non-specific agents may properly be described as a syndrome. The type of agents he considers are as diverse as exposure to cold, spinal shock production, excessive muscular exercise, intoxications with sublethal doses of diverse drugs (adrenaline, atropine, morphine, etc.). The syndrome is regarded as a response to damage as such, and not at all referable to the particular agent involved. The syndrome is divided into three stages. The first stage occurs during the six to forty-eight hours after the initial injury, and is designated by Selye as the "general alarm reaction." During this stage the manifestations are extraordinarily complex: there is a rapid diminution in size of thymus, spleen, lymph glands, and liver; fat tissue tends to disappear and oedema occurs in the thymus and the loose retroperitoneal tissue; transudate accumulates in the pleura and peritoneum; muscular tone is diminished and there is a fall in temperature; acute erosions in the gastro-intestinal tract appear; the adrenals lose cortical lipoids and chromaffin substance; and there may be cutaneous hyperaemia, exophthalmos, and increased lachrymation and salivation. In severe cases the first stage may include focal necrosis of the liver and dense clouding of the lens. Forty-eight hours after the initial injury the second stage supervenes: adrenals are enlarged (medullary cells vacuolated); oedema begins to disappear; basophil cells in the pituitary increase, the thyroid seems hyperplastic, general body growth ceases, and the gonads atrophy; in lactating animals the milk secretion ceases. Continuation of the injury may lead to the stimulation of such resistance in the animal that normal function may practically be recovered. But if the injury continues long enough and is sufficiently severe, resistance is lost and the animals succumb with symptoms like those of stage one: this last stage is stage three. The pictures presented in stages one and three are suggestive of a histamine-like action, and Selye tentatively suggests that something of this nature may be involved. This syndrome (if it can rightly be called a syndrome) is suggested as the type response of the organism to stimuli to which habituation or inurement can occur. The conception may prove a useful one in that it emphasizes the main reaction of the organism; the elucidation of the mechanism and interrelation of the separate components of the clinical picture may lead to valuable results. The building up of resistance in the second stage presents a baffling problem. We may await with interest the further development by Dr. Selye of his conception.

SCALENECTOMY

The mutilating nature of thoracoplasty and the extent of the associated shock have in recent years led to the search for less severe operations, by which it might be hoped to produce a similar, if less important, beneficial effect. The results achieved by them have, however, seldom come up to the expectations of their enthusiastic designers, and gradually the indications for their use have been narrowed down and more clearly defined. In a recent article[1] A. Maurer, O. Monod, and J. Beuzart present their experience of scalenectomy in the treatment of tuberculous cavities of the apex. At the very outset they emphasize that this operation has only a small place in the treatment of such cases, and that by it alone no obvious benefit is obtained. According to them only two indications exist for its use. It may be performed as a subsidiary measure to phrenic interruption; for, they point out, although the latter may produce some immediate relaxation of the apex of the lung as well as of the base, at a later stage there occurs in some cases an increase in the respiratory movement of this zone owing to a compensatory transverse expansion of the upper part of the thorax. To reduce this, scalenectomy, to which should be added injection of the intercostal nerves with alcohol, may be carried out. The authors suggest that where scalenectomy follows a temporary operation on the phrenic

[1] *Journ. Lab. and Clin. Med.*, 1936, xxi, 775.
[2] *Nature*, July 4th, 1936.

[1] *Mém. de l'Acad. de Chir.*, 1936, lxii, 467.

nerve (" crush," or injection with alcohol) it should be associated with a secondary phrenicectomy. A temporary phrenic operation should never be done at the same time as a scalenectomy, since the more extensive dissection carried out and subsequent cicatrization may render it extremely difficult or impossible to find the nerve should a further operation on it be contemplated later. A combined primary phrenicectomy and scalenectomy is, however, recommended for some cases. The second indication is put forward by the authors somewhat tentatively: very rarely scalenectomy may be carried out as a preliminary measure to an upper thoracoplasty when the general condition of the patient is so poor that it does not allow the more effective, but also more severe, procedure of removal of the first rib. The material discussed in the paper consists of thirty-five cases operated on by the authors. In four patients only (12 per cent.) could the result be considered definitely good, but in none was the condition rendered worse. The technique of scalenectomy in different circumstances is fully described and illustrated. The operation, they conclude, requires a " delicate technique," but no " accidents " occurred in their series. The detailed reports on the four cases are not sufficiently convincing in favour of scalenectomy, as in each of the three patients in whom the result was considered favourable a phrenic interruption was performed at the same time. On the authors' own showing, therefore, there seems little justification for retaining scalenectomy among the surgical methods of treatment of pulmonary tuberculosis.

MORPHOGENETIC HORMONES

Dr. Joseph Needham in the Terry Lectures,[1] which were delivered at Yale University last year, undertook the task, for which he was exceptionally well qualified, of correlating our knowledge of the morphology of cell development with recent advances in biochemistry. These advances have been numerous and indeed have constituted one of the most striking features in the development of the biological sciences during the past decade, and the discovery of cell organizers is one of the most interesting of them all because of its fundamental importance for biology. The author gives a short but clear summary of this interesting subject. In 1924 Spemann and Mangold showed that transplantation of a piece of a *Triton* embryo could induce the formation of a new embryonic axis, with the result that a single egg produced a double embryo. In 1931 Spemann showed that the same effect could be produced by pieces of tissue after the cells had been destroyed. This discovery proved that the organizer was of a chemical nature, and stimulated intensive biochemical research. This work has had the remarkable result of showing that the organizer is in all probability a sterol, closely related to the female sex hormones and the carcinogenic compounds. Waddington and Needham have actually proved that synthetic carcinogenic hydrocarbons can act as organizers. Ten years ago scarcely anything was known about the biological importance of the sterols beyond the fact that cholesterol was a constituent of all living cells and that bile acids were essential for the digestion of fats. To-day the group of sterol derivatives includes the antirachitic compounds, the cardiac glucosides, the male and female sex hormones, the carcinogenic agents, and (last but probably not least important) the organizers that direct embryonic development. The fact that the chemical substances directing the normal development of embryonic tissue are closely related to the chemical substances which can produce abnormal cell division is obviously of great theoretical interest and of equally great potential practical importance. Dr. Needham in his lectures has dealt with a large variety of other problems, and they will appeal to all who are interested in the fundamental problems of the mode of organization of the living cell.

[1] *Order and Life.* By Joseph Needham. New Haven: Yale University Press. London: Cambridge University Press. (8s. 6d.)

NEW USES FOR HEPARIN

A series of recent papers by Swedish authors[1] deals with some interesting work on heparin, a substance now sufficiently known as recoverable by extraction of liver, and having the property of preventing the coagulation of blood. The first of these, by Jorpes, discusses the properties and composition of heparin, and records the preparation of a product of greater purity and activity than those obtainable commercially. This product was used by the other authors for four purposes of some clinical interest. The simplest of these is the red cell sedimentation test, the findings of which are of course affected by the citrate which is usually added. By observations on haemophilic blood, for which no anti-coagulant was necessary, Enocksson and his colleagues were able to show that heparin has no appreciable effect on the sedimentation rate, whereas citrate diminishes it, and the difference between the two was also demonstrated by tests over a considerable range of different rates. It is clear that the test is more sensitive when heparin is used. Sköld has used heparin as an anti-coagulant in blood transfusion, and in this as in the foregoing proceeding there seems to be every advantage except the cost of the material. The other two suggested uses are more ambitious and of hitherto less demonstrated value. Hedenius and Wilander have found it possible to prolong the coagulation time of the blood by repeated intravenous injections of heparin, and suggest this as a means of preventing post-operative thrombosis, while Wildstrom and Wilander have shown that heparin injected into the pleural cavity of rabbits will prevent the formation of adhesions consequent on the previous injection of iodine. Of these two proceedings the latter appears to be the more promising, and certainly better adapted to conclusive clinical trial, although it remains to be seen whether in exudates due to bacterial inflammation as distinct from chemical irritation the deposition of fibrin will be prevented and absorption accelerated, as in these experiments. Fortunately heparin is thermostable, and there is therefore no difficulty in sterilizing solutions for clinical use ; the only difficulty that will face would-be users is in obtaining good heparin at any but an almost prohibitive price.

Dr. Arthur P. Gibbons has been appointed Master of the Society of Apothecaries of London for 1936-7, and Mr. Hugh Lett and Dr. Reginald H. Hayes, Senior and Junior Wardens, respectively, for the same year.

[1] *Acta Med. Scand.*, 1936, lxxxviii, 427, 434, 440, 443, 450, 455.

TREATMENT IN GENERAL PRACTICE

This article is one of a series on the management of some of the renal diseases met with in general practice. The first group of articles on Treatment in General Practice, thirty-five in number, was republished in book form last March by H. K. Lewis & Co., and a second volume will appear in the autumn.

THE TREATMENT OF NEPHROSIS

BY

ROBERT PLATT, M.D., F.R.C.P.

The type of renal disease generally known as nephrosis, or lipoid nephrosis, is characterized by its insidious onset and chronic course, and by the presence of copious albuminuria and generalized oedema, which is often extreme. Some hold that it is of a different nature from other types of renal disease; others that it is merely a variety of subacute nephritis, which it closely resembles. The controversy cannot be pursued here, but whatever view is held the differentiation of nephrosis, whether as a distinct entity or a variety of renal disease, is of some practical value, because in this type of case recovery may be complete (though it rarely is) even after months or years of illness, and in the fatal cases death is far more likely to supervene from intercurrent infection than from renal failure (uraemia). It is, in fact, typical of nephrosis that throughout its chronic course no failure of the excretory power of the kidney usually develops. The treatment of nephrosis, therefore, differs in some important respects from that of nephritis, and it is essential at the onset that a correct clinical diagnosis should be made.

This is done by a general survey of the history and the signs and symptoms. The onset, as already stated, is insidious. If there has been a previous attack of acute nephritis, if there is or has been any haematuria, or if the blood pressure is raised, the patient should on no account be treated as a case of nephrosis, but as one of active or unhealed nephritis. Should haematuria or hypertension develop during the further course of the disease the diagnosis should be revised, and the case treated as one of nephritis. Blood tests are of little value in the differentiation of nephrosis, because the characteristic high cholesterol and diminished protein content are also found in subacute nephritis. As there is no renal insufficiency the blood urea is not increased.

Two other conditions may closely resemble lipoid nephrosis and must further be distinguished because of their special treatment. (1) Syphilis may give rise to a similar clinical picture; if it is suspected and a positive Wassermann reaction is discovered the usual antisyphilitic remedies should be employed. (2) Amyloid nephrosis is distinguished by the coexistence of tuberculosis or chronic suppurative disease and by the other signs of amyloidosis—namely, enlargement of the liver and spleen, and diarrhoea. The prompt treatment of the underlying infection represents the only hope of recovery.

Lipoid nephrosis occurs in infants, children, and young adults.

General Management

The diagnosis having been made, the first duty of the practitioner is to see that competent nursing can be obtained for the patient and continued if necessary for a very long time. Records will have to be kept of the quantity of urine passed, of the amount of albumin therein, and of the pulse and temperature. Diets must be accurately prepared, and the response to changes in treatment carefully noted. It is a great advantage if the patient can be weighed regularly, this being the most reliable guide to changes in the amount of oedema. Admission to a nursing home or hospital for several weeks is therefore almost an essential, and during this time the patient's relatives, if intelligent, may be trained to continue the treatment later at home. In nearly every instance the patient should be confined to bed throughout the illness. This rule should only be relaxed if practically all the oedema has disappeared and the only remaining evidence of disease is albuminuria which every possible effort has failed to clear up.

Owing to the danger of infections of all kinds the greatest possible care should be taken to guard against exposure to cold and contact with persons who may be carrying infection, and scrupulous attention must be paid by the nurse to the cleanliness of the skin and mouth. If there is reddening of the oedematous skin over the pressure points, a water bed should be obtained and a cradle to keep the weight of the bedclothes from the patient's legs and feet. Oedematous patients are usually more comfortable when supported by a bed rest, and this has the advantage of encouraging the oedema to collect in the more dependent parts.

Dietetic Treatment

The principles of dietetic treatment differ in some important respects from those applicable to other types of renal disease. The constant loss of considerable quantities of protein in the urine leads to a depletion of the protein of the blood plasma. This, as Epstein has shown, is an important factor in the causation of the oedema, and an adequate supply of protein must therefore be ensured in the diet. In nephrosis this is not contraindicated by any consideration of renal inadequacy, because, as already stated, the renal efficiency is maintained. Epstein introduced in 1917 the high-protein, low-fat diet for nephrosis, and although it has not produced the uniformly successful results which were hoped for, it will provoke diuresis and reduce oedema in a fair number of cases, and is worth trying at intervals during the treatment.

Whatever the cause of the oedema it represents a retention in the body of salt and water which the kidney is failing to excrete. Salt and water must therefore be given very sparingly, as any excessive ingestion of these only increases the amount of oedema present.

The following diet fulfils the desired features of restriction of salt and water, with liberal protein and minimal fat.

Breakfast.—5 oz. tea or coffee with skimmed milk. 4 oz. fish. Bread. Marmalade.
Mid-morning.—One small orange or apple.
Lunch.—Oysters if procurable. 4 oz. lean meat or chicken. Peas, beans, or lentils. Milk pudding. 3 oz. fluid.
Tea.—5 oz. tea with skimmed milk. 2 oz. fish or lean meat. 6 oz. salad or fruit.
Supper.—4 oz. fish or lean meat. Vegetables, salad, or mushrooms. 5 oz. tea or coffee with skimmed milk.
No salt to be cooked or eaten with the food. No extra fluid.

This diet may be taken for a month or two at a time, provided the appetite of the patient is good. In the intervals an ordinary diet may be ordered containing as much protein as the patient wishes, but with the fluid content restricted to about one pint per day for an adult. In no case will salt or salted foods be allowed.

For a child the fluid allowance will be restricted in proportion to the average weight for his age, the actual weight being unreliable on account of oedema. To allow fish and to exclude meat as a source of protein has no

scientific advantage, and merely reduces the variety and palatability of the diet. The records of the case will show whether the high protein diet is causing an increased diuresis and reduction of the body weight (oedema).

Drug Treatment

There being no drug known to influence the course of the pathological process in the kidney, the drug treatment of nephrosis consists essentially in a further attack on the oedema. Of the many diuretics which have been used in this disease two groups only need be discussed in detail.

1. Urea is an efficient diuretic if given in sufficient quantity. At least 15 grams, dissolved in 100 c.cm. of water and flavoured with tincture of orange, should be administered three times daily. Diuresis will be noticeable within three or four days if the treatment is successful, and the drug may be given for several weeks at a time, though it sometimes has to be discontinued on account of thirst or nausea.

2. In obstinate cases of nephrotic oedema, when other measures have failed, the mercurial diuretics may be employed, always provided that the essential criteria of the diagnosis have been fulfilled—absence of haematuria, high blood pressure, or nitrogen retention. This group of drugs acts more efficiently if the patient has received some days beforehand one of the acid-producing salts. One may therefore prescribe:

℞ Ammon. chlorid. ... ... gr. xxx
Ext. glycyrrhiz. liq. ... ... ♏ xxx
Aq. ... ... ad. ʒ j
ʒ j t.d.s.

On the second or third day the mercurial drug is given. This may be either salyrgan, 1/2 to 1 c.cm. intravenously, or neptal or salyrgan, 1 c.cm. intramuscularly, or a novurit suppository per rectum. The ammonium chloride can be continued and the diuretic drug repeated every third or fourth day for a dozen or more injections. If the intravenous route is chosen extreme caution must be used to prevent even the smallest drop of salyrgan escaping into the subcutaneous tissues as the drug is highly irritating and may cause intense swelling, pain, and redness at the site of the injection. It is even as well, after taking the salyrgan into the syringe, to draw in a drop of sterile water, so that if there is any leakage from the needle as it pierces the skin only water will be introduced. A little blood is withdrawn to show that the needle is in the vein, the tourniquet is loosened without a jerk, and the injection is administered slowly. If the needle is in position it will be quite painless, and the patient will " taste " the drug within a few seconds. Before the needle is removed, another drop or two of blood is withdrawn into the syringe to rid the needle of any trace of salyrgan. If the intramuscular route is chosen a needle at least 1¼ inches in length is inserted perpendicularly into the muscle of the upper and outer quadrant of the buttock, or into the deltoid muscle if this is sufficiently thick. If intramuscular injections are painful a little novocain may be given mixed with the salyrgan or neptal. The suppositories are less efficient but of course easier to administer. They occasionally give rise to diarrhoea. Diuretics of the caffeine group, such as diuretin and euphyllin, are of less use in nephrosis, but may be given if urea is not tolerated and injections not desirable, for instance in children.

Apart from diuretics, the following medicaments have some place in the treatment of nephrosis. Iron should be prescribed if anaemia is present. This should be judged by an actual haemoglobin estimation, as the characteristic pallor of the disease is due not to anaemia but to oedema. Thyroid extract or thyroxine is extremely well tolerated in nephrosis, and appears to improve the general condition and encourage diuresis in some cases: 5 to 10 grains of the extract, or 1 mg. or even more of thyroxine, per day may be safely prescribed if the pulse is watched for any undue increase in rate. Finally, constipation must be avoided, and if an aperient is necessary magnesium sulphate is the most suitable, as it promotes the withdrawal of water without irritating either colon or kidney.

Mechanical Treatment of Oedema

If the pleural cavities are involved the fluid should always be removed, because to do so relieves respiratory distress, and an unexpected empyema may occasionally be found. Ascites should only be tapped if very large and giving rise to much discomfort. Subcutaneous oedema should never be relieved by Southey's tubes or by incisions unless it is very distressing to the patient and diuretics have failed to reduce the oedema sufficiently. The reason for this advice is the danger of a spreading cellulitis resulting in the oedematous tissues. An exception may have to be made if swelling of the genitals renders it difficult for the patient to pass urine. In that case a number of pricks can be made in the penis with a sterile sharp surgical cutting-needle.

Removal of fluid may be attempted via the sweat glands by either hot packs or radiant heat baths or an electric blanket. It is difficult to produce diaphoresis in grossly oedematous patients, and the strictest precautions must be taken to avoid burning or blistering the skin. For these reasons the methods are not of much practical value.

Treatment of Infections

The only established fact in the aetiology of nephrosis is that it is a disease which has some association with infective conditions in the body. Thus it may develop in connexion with infections of the antra and sinuses, mastoiditis, otitis media, inflammatory conditions of the skin, or more deep-seated diseases such as appendicitis or cholecystitis. Its association with tonsilitis is less obvious than is the case in nephritis. The frequency of septic complications has already been mentioned, and the likelihood of the pneumococcus being the infective agent is striking. Thus pneumococcal empyema, peritonitis, pericarditis, pneumonia, and meningitis are the common causes of a fatal issue. Parotitis is another complication which may prove fatal. These are treated on the principles applicable to the particular case, and though such infections may prove to be terminal the recovery from a pyrexial complication has been known to be closely followed by complete recovery from the renal disease as well.

Because of this association with infections it is extremely important that a careful search should be made early in the disease for any active focus of sepsis, and if such be found a suitable operation should be performed. Thus an antrum must be drained, a mastoid operation performed, and even the appendix removed if the indications are sufficiently definite. Although such operations are not to be lightly undertaken, they represent the only possibility of curative therapy—that is, of the removal of the cause of the disease—and it is extraordinary how well an oedematous patient will often come through operative procedures of this kind.

Finally, a few words may be said on the general outlook. Nephrosis is usually a fatal, and always a serious, disease. It is, however, subject to spontaneous remissions, often sudden ones at unexpected times, and in some cases these may become complete, the patient recovering entirely after many weeks or months of illness. However unfavourable the position may appear, therefore, it is always worth continuing the therapeutic attack, and thus increasing the likelihood that the patient will survive long enough for a natural remission to appear.

Nova et Vetera

THOMAS LINACRE AND THE FIRST SCHOLAR-PHYSICIANS OF OXFORD*

BY

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Thomas Linacre and Leonicenus were the greatest physicians of the early Renaissance. Around the former radiated a group of other eminent physicians who, with the exception of Caius, were all of Oxford. The studies and medical preparation of Linacre belong to the last quarter of the fifteenth century; the period of active life, as in the case of the other great Oxford scholar-physicians, belongs to the first quarter of the sixteenth century. Thomas Linacre and his satellites represent that period of Oxford in which Greek learning was introduced and modern or Western European medicine originated.

Greek Learning and Medicine

Greek learning was intimately bound up with the inception and development of modern medicine, and Thomas Linacre was a great Greek scholar as well as a great physician—a combination exhibited also by his Oxford contemporaries and associates, Edward Wotton, John Clement, Richard Bartlot, Thomas Bentley, John Chambre, as well as by his Cambridge counterpart, Caius. It is easy to understand the relation between Greek learning and medicine if we follow in broad outline the history of our science.

Medicine—scientific medicine and not the mystical magic and empirical healing art of the ancient Eastern peoples—began with the ancient Greeks. From the seventh century B.C. to the seventh century of our era, from the Ionian physiologists, Pythagoras and Alcmaeon, to Alexander of Tralles and Paul of Aegina, medicine was essentially Greek. The Romans had no medicine as they had no science, and the only medical work in Latin, that of Celsus, was an elegant compilation of Greek medicine written by a dilettante. When, in the eighth century A.D., the Arabs felt the urge to practise and develop medicine their only source was the writings of the Greek physicians and scientists. Under the Abbasides in Bagdad remarkable translations were made of the Hellenic writings, of which the Arabian physicians gave various interpretations, without, however, adding any original work. From the eighth century to the end of the twelfth medicine was again Greek, but in Arab dress. The Arabian interpretation of medicine was inferior to the purely Hellenic healing art, not only because it was not original but because Greek writers taught, besides facts, a technique of reasoning and observation, whereas the art of reasoning cannot be found among Arabian physicians.

When in the thirteenth century men appeared who felt the need to develop medicine two routes lay open to them: they could read and study medicine in the original Greek, or study it through Arabian interpretations. They chose the latter, and from the end of the thirteenth century to the end of the fifteenth European medicine was Arabian—that is, second-hand Greek. The reason for this devious method of study can be found in the fact that it was difficult for Western Europeans of those days to study Greek. The mediaeval Church had set its face against Greek. Knowledge of that language meant studying Greek science and enlightenment, and the Church stood firm against science and enlightenment. Greek was the language of a great Christian Graeco-Byzantine empire, Christian but not bowing to the Roman pontiff.

These conditions could not endure. Arabian-taught medicine was scholastic and sterile. Powerful thinkers of the times recognized the necessity of direct contact with the Hellenic writings. John Basingstoke, an Oxford man, travelled to Greece, and there learnt Greek from a learned Athenian woman, Constantina. He returned to England with Greek manuscripts, and was soon in contact with the great churchman and scholar Robert Grosseteste (1175–1253). Grosseteste's life is in large part bound up with Oxford, where he was educated. Wishing to increase his knowledge of true science he studied Greek not only at second hand in Paris but at Oxford with a native Greek, Nicolas or Elicheros, and began to translate Greek authors, unfortunately not important writers. His friend and Oxford contemporary, Roger Bacon, the *Doctor mirabilis*, with the courage and energy which characterized his whole life, pointed out that the knowledge received from the Arabian writers was imperfect because of faulty translation, and he blamed the professors for not learning Greek so as to be able to read Aristotle and other writers in the original.

This thirteenth century revival of the Greek language and of science at Oxford did not long continue. Grosseteste was too much occupied with political activities, and Roger Bacon was too much persecuted by the Church. The movement, however, was the beginning of that greater renaissance at the same university in the days of Linacre.

Thomas Linacre

Thomas Linacre was fortunate in his studies, in his teachers, and in his fellow-students. His first teacher at the school of the Christchurch convent of Canterbury was William Selling, an Oxford man and a Fellow of All Souls. Selling had travelled in Italy at a time when that country was fostering a great renaissance of Greek teaching under Greek scholars. He had thus learned Greek at first hand, and he had brought back with him Greek manuscripts. The teaching he gave his favourite pupil was not the scholastic teaching of the period but more classical. At the age of 20 Linacre went to Oxford, and although we do not know his first college we find him four years later a Fellow of All Souls. At Oxford he continued his Greek studies under the Italian, Vitelli, a man of noble birth, who had learned Greek from Greeks and was probably the first teacher of that language in the university. At Oxford Linacre became intimately acquainted with William Grocyn and William Latimer, who were pursuing classical studies, and who, like Linacre, were among the principal figures in the revival of Greek language and learning in England.

A few years after the beginning of his Oxford life Thomas Linacre was again blessed by fortune. His teacher, William Selling, was sent on a mission to Italy, and the learned man took with him his favourite pupil. This Italian journey is the crux of Linacre's life. In Florence and in Rome he was in touch with the three great humanists, Demetrius Chalcocondylis, Politian, and Hermolaus Barbarus. It was the Greek Chalcocondylis who exercised the greatest influence on Linacre. Chalcocondylis was one of those whom the Greeks call "great teachers of the race." His learning was extensive but his teaching was not purely philological. His aim was to inspire his pupils, some of whom became illustrious men, with the spirit of clear thinking and of logic, and with the high ideals of ancient Greece. He was a great character as well as a great scholar, and at this time was director of the Greek school of Florence founded by another "great teacher of the race," Emanuel Chrysoloras. He was also tutor to the sons of Lorenzo de' Medici. The other teacher of Linacre, Politian, was a man of considerable learning too, but his character and moral standards fell short of the ideals of the classical thinkers whose principles he taught. Hermolaus Barbarus, a lover of natural history and translator of Dioscorides, was an erudite and slightly epicurean dilettante.

From Florence Linacre proceeded to Venice, where he helped Aldus Manutius, the famous printer, in the correction of Greek texts, and thence to Padua, where he

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crowned this period of study in Italy by completing his scientific and medical studies and graduating M.D. After graduation, probably in 1490, Linacre returned to Oxford, where he continued teaching Greek and medicine. He and his friends Grocyn and Latimer fought for the introduction of Greek classical teaching. The fight was hard, because the Church continued its opposition. It is even said that a monk was preaching so vehemently in Oxford against Greek teaching that he was stopped by Royal command. The early Tudors showed great interest in the renaissance of learning. Oxford, with Linacre and his circle, became a centre of classical learning, and Erasmus himself came there to learn Greek with Grocyn, Latimer, and Linacre. The fame of Linacre as scholar and physician, however, was already very considerable, and led to the interruption of his academic career, for he was called to London as tutor and physician to Prince Arthur, the first-born son of Henry VII.

Linacre's Most Active Years

With the beginning of the sixteenth century—the appointment was made in 1501—Thomas Linacre entered upon the most active period of his life. Tutor and physician to Prince Arthur, first physician probably to Henry VII, although only in conjunction with the Italian Giovanni Battista de Boeria (who was more astrologer than physician), and physician to Henry VIII, he was at the head of medicine in the British Isles. His eminence and skill as a physician, due to the clear rational thinking with which he had been imbued by study of the Greek masterpieces, spread far beyond court circles. He was physician to all the great of his time, including Cardinal Wolsey. He frequented the house of Sir Thomas More, and his advice was asked by many. There are characteristic letters from Erasmus asking the opinion of Linacre, and lamenting the distance between them which deprived him of his friend's personal skill in the alleviation of his sufferings.

About nine or ten years after settling in London Linacre entered the priesthood. It must be remembered that priesthood and medicine even at that time formed an excellent combination. The retiring and scholarly disposition of Linacre made him take this step. His friendship with William Warham, Archbishop of Canterbury, facilitated his course of ecclesiastical preferment, but his entry into holy orders made no difference to his medical activities. It was at this period that he began his translations from Galen. In 1517 *De Sanitate Tuenda* was printed, and in 1519 *Methodus Medendi*. Other translations followed: *De Temperamentis, De Naturalibus Facultatibus, De Pulsuum Usu*, and lastly *De Symptomatum Differentiis*, published posthumously. These translations brought him great renown among all the physicians and humanists of Europe.

It may seem remarkable that so many scholar-physicians of the Renaissance chose Galen and not Hippocrates. This may be due to the fact that Galen gives a system of medicine more easily understood, a system in broad outline based on the ideas of Hippocrates. In fact, Galen had fallen into disrepute because of the faulty translations and interpretations of the Arabs, but actually he was a great Hippocratic physician. He had the misfortune to have bad pupils, and through them his reputation was clouded. The work of Linacre and others was to show the real Galen, the man who taught facts—facts, it is true, which could not remain unchallenged—the man who taught a method of clinical thinking.

To his medical works Linacre added grammatical ones. Appointed to supervise the health and education of Princess Mary he prepared for her his *Rudiments of Grammar*; but his great grammatical work, published in 1524, was *De Emendata Structura Latini Sermonis*, which brought him disillusion in England but great fame throughout the rest of the world.

Foundation of the Royal College of Physicians and the Linacre Lectureships

Linacre had become a great physician, and life was drawing to a close before he crowned his work of medical reform by giving it a safe organization. Through his influence with Henry VIII and Cardinal Wolsey he obtained in 1518 letters patent for the foundation of the College of Physicians of London. He probably took as a model similar institutions existing in Italian towns. His object was to incorporate the physicians practising in London into one body which would promote the advancement of science and would control medical practice, which was then very irregular and had fallen into the hands of quacks and the ignorant. Through this foundation Linacre initiated the history of British medicine. Later in life he founded the Linacre lectureships, two at Oxford and one at Cambridge. This he did at a time of suffering, which for long periods made him an invalid, and which he bore with great fortitude until his death in 1524.

On the flyleaf of the remarkable *Life of Thomas Linacre* by John Noble Johnson, Fellow of the Royal College of Physicians, published in 1835, we read: "As this book did not sell I destroyed all but a few for presents only." Linacre was simply an uninteresting relic to the nineteenth century, "the century without history." Our ideas have greatly changed, and to-day we can but render homage by interest in the life of the man who embodied to a high degree the noblest qualities of the physician, scholarship, science, clear thinking, and, above all, those lofty standards of character which made his personality radiate kindness and sympathy in the sixteenth century.

The First Scholar-Physicians of Oxford

When a man possesses the qualities that Thomas Linacre did he becomes a source of mental energy which reacts on his immediate surroundings. Pupils, friends, and contemporaries draw from him inspiration. Around Thomas Linacre were grouped the first humanist-physicians, who, with the exception of Caius, all belonged to this university. Among them were John Chambre, Richard Bartlot, and Thomas Bentley. John Clement and Edward Wotton were younger, and can be considered as his immediate pupil successors. All of them except Chambre were presidents of the Royal College of Physicians.

John Chambre (d. 1549) was a Fellow of Merton College; he studied also in Padua and in Paris, where he graduated M.D. He succeeded Linacre as physician to Henry VIII. He does not, however, seem to have been very active at the Royal College of Physicians, but after the death of Linacre he was the greatest physician of the realm. His portrait by Holbein the younger at the Lichtenstein Gallery in Vienna shows a powerful intellectual physiognomy. With Linacre he was instrumental in the creation of the Royal College of Physicians, but apart from that we do not know how he influenced the medical reformation.

Richard Bartlot (1470–1556) belongs to All Souls College, the college of Linacre. Caius spoke of him as "very famous for his knowledge of physic." He was extensively learned not only in Greek mediaeval writings but also in those of mediaeval authors, and he thus tried to balance the two schools of thought. He was the first Fellow elected in the Royal College of Physicians, of which he became president at three different early periods.

Thomas Bentley of New College closes this incomplete list of the early scholar-physicians of Oxford. Like the others he was President of the Royal College of Physicians of London, and, like his contemporaries, the satellites of Linacre, he was well versed in Greek learning. Wraugham in his *British Plutarch* quotes on the authority of Cumberland a classic anecdote. When Bentley was in his old age Mrs. Bentley lamented that he had bestowed so great a portion of his time and talents upon studies of ancient Greek authors instead of employing them in original work. Bentley remained for a considerable time thoughtful and seemingly impressed by her remarks. At last, recollecting himself, he said:

"Child, I am sensible that I have not always turned my talents to the proper use for which I should presume they were given to me. Yet I have done something for the honour of my God and the edification of my fellow creatures. The

wit and genius of these old heathens beguiled me, and as I desired to rais myself to their standard upon fair ground I took the only chance I had of looking over their heads to get upon their shou'ders."

John Clement (1490–1572) is probably the most interesting figure of the scholar-physicians coming immediately after Linacre. I do not know why a shadow has fallen over the life and work of this great physician, who has been retrieved from oblivion only by the monograph of Ernst Wenkebach. The year of his birth is not known with precision—he was born at the end of the fifteenth century—nor the early years of his studies, although Wenkebach holds that he was a pupil at the school of St. Paul's, which the famous Dean Colet had made a centre of classical learning in London. The first event in his life to colour his future years was his appointment to the household of Sir Thomas More. It is probable that he received great inspiration from the distinguished circle to which belonged the great hero of medical youth of those days, Thomas Linacre. In 1518 we find him at Oxford, at Corpus Christi, as reader in rhetoric in the chair founded by Cardinal Wolsey, and later as professor of Greek in the chair founded by the same cardinal and Cardinal Fox.

Like all the Renaissance scholar-physicians he was seized by the desire to travel. In 1521 he went first to Louvain, afterwards to Padua, where he met another of the lieutenants of Linacre, Edward Wotton. He graduated in medicine at Sienna, and remained in Italy to assist Professor Opizo of Pavia in editing Galen and, like Linacre, helped with the Greek editions printed in Venice. He returned to London in 1526 and married the virtuous and learned stepdaughter of Sir Thomas More, Margaret Giggs, and began medical practice there. Success came rapidly on account of his great skill and important connexions. He was consulted by the great and was even among the physicians of the King. He was elected to the College of Physicians and appointed to the important post of concilarius in the College. With the disgrace and death of Sir Thomas More his fortunes suffered eclipse, but, all the same, we find him nine years afterwards President of the Royal College of Physicians.

Again, however, his fortunes sank with the persecution of the Catholics, as John Clement stood fast by his religion. He was forced to leave London, and died in a foreign land. Like the other Renaissance physicians his Greek learning gave precision to his medical thought and practice. His published work consisted more in interpretation and translation from the Greek ; but there can be no doubt, however, that contact with the natural methods of the ancients must have led him, like Linacre, to opinions based wholly on his own observation.

Edward Wotton (1492–1555) belongs to Magdalen College, Oxford, where he was Fellow. In 1516 he became professor of Greek at Corpus Christi, but a short time afterwards Bishop Richard Fox, founder of the college, gave Wotton leave to travel in Italy " to improve his learning and chiefly to study Greek." In Italy we find him at Padua with John Clement and other English students, and here he graduated M.D. Returning to Oxford and very soon afterwards settling in London, he practised medicine with success, became President of the Royal College of Physicians, but studied zoology in particular. He can be considered as the first British zoologist and the first Fellow of the Royal College of Physicians to insist on the introduction of zoology into medical studies.

Foundation of Modern Medicine

Dr. Arnold Chaplin remarked in his Harveian Oration for 1922 that an unjustified neglect has beset the memory of these scholar-physicians, and that their part in the history of medicine has not been sufficiently emphasized. I can go further and attribute to them the foundation of modern medicine. It is true that they were scholars first of all, but they were equally good physicians. There is abundant testimony of the diagnostic and therapeutic skill of Linacre and also of John Clement. Study of the Greek physicians had trained them in careful observation and clear reasoning. At the same time, it had developed those human qualities which make for medical success. I suspect that the belittlement of the medical calibre of these scholar-physicians comes from the prejudice, unfortunately common in the late nineteenth century, against scholarship for physicians. The history of medicine, however, teaches us that nearly all great physicians of all ages up to the present time had a scholarly mind and training.

These Oxonians, as well as their Cambridge contemporary, Caius, were really skilful physicians. The part they played in the science and practice of medicine consisted in the introduction of new methods and in the revival of the Hippocratic approach to disease. They taught their contemporaries how to observe, how to reason clearly, and how to think for themselves instead of repeating " parrot-wise " the texts of authorities. Through the introduction of these new methods modern medicine was born. It is true that the first physician to give the humanistic Hippocratic impulse to medicine was an Italian, Leonicenus (1428–1524), professor at Padua, Bologna, and Ferrara ; he was the first to show that the Arabs had not understood Hippocrates and the other Greeks, and to indicate through study of the original Greek texts the real medical methods. His pupil and successor at Ferrara, Giovanni Manardi (1463–1536), followed in the steps of his teacher.

However, only a few years after the first works of Leonicenus, Thomas Linacre and the scholar-physicians of Oxford started the movement for the Hippocratic revival. England always takes in hand the great Mediterranean movements. It has been said with truth that England is an island that often is bathed in Mediterranean waters. Not only did England take up the movement but she organized it. The reform of medicine through Greek study, initiated in Italy, reached its zenith in England through Thomas Linacre and his contemporary scholar-physicians. The French humanist-physicians like Symphorien Champier (1472–1539), Pierre Brissot (1478–1522), and, it must not be forgotten, Rabelais (1490–1553), came a little later, and the German humanist-physicians Henry Cornelius Agrippa (1487–1534), John Gauthier d'Andernach (1487–1574), and Janus Cornarius (1500–1558) later still.

Thomas Linacre, John Chambre, Richard Bartlot, Thomas Bentley, John Clement, Edward Wotton, did not discover new facts in anatomy, physiology, or nosology. They did something more important, however, in introducing the method by which great discoveries were made later. When we see what medicine was before Thomas Linacre, a collection of Galenic and scholastic teachings, and when we realize the strength of the impulse given by Linacre and his Oxford contemporaries to the development of true medicine founded on fact, on observation, and on clear thinking, we must admit that these men did something more than mere translation and critical work. If it had not been for Linacre we should have had neither Harvey nor Sydenham, Pasteur nor any of the modern scientists who find the road of clear thinking so easy because those sixteenth-century pioneers traced it with such energy and sacrifice of their health and often of their liberty and life.

B. W. Carey (*Journ. of Pediat.*, May, 1936, p. 626), who reports an illustrative case, maintains that infection with a member of the genus *Listerella* is more frequent than the number of published cases indicates, and that probably such organisms have been classed among the diphtheroid group. Agglutination of the organism in normal horse serum suggests that this may be of diagnostic value in establishing the identity of similar organisms in human or animal infections. Carey's case was that of a boy aged 3 years and 8 months, admitted to hospital with symptoms of acute meningitis of four days' duration. From the cerebro-spinal fluid a small Gram-positive bacillus was grown presenting all the characteristic features of the genus *Listerella*, including agglutination of the organism by the patient's serum and agglutination in normal horse serum in a dilution of 1 in 640. Recovery took place.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The annual meeting of the British Association for the Advancement of Science is being held this year at Blackpool, from September 9th to 16th, and, as in recent years, considerable attention is devoted to the relation of new scientific discoveries and conceptions to the general conditions of living. The president, SIR JOSIAH STAMP, in his address which was delivered on the evening of the opening day dealt with the impact of science upon society.

Science and Society

Sir Josiah Stamp rejected the rather pessimistic view taken by some of his predecessors as regards the inability of the present age to adapt itself adequately to the rapid advances being made in all branches of science. He thought that the duality which placed science and the other activities of men in contrasted categories, involving disharmonies which had to be resolved, was unreal. He admitted, however, that the advances made in the science of matter called for comparable progress in the understanding of the science of man, and particularly in the growth of knowledge about mental processes and evolution. The pleadings voiced in previous years for the study of ethical values, spiritual betterment, the right use of leisure, moral advances, and mental development did not involve new activity so much as a change in the direction of scientific investigation ; the now characteristic teamwork of scientists would exert a most beneficial effect on the evolution of science generally on these broader lines.

Avoidable friction in the reception given to scientific discovery deprived the community of advantages it might have enjoyed much earlier, and might also render their adoption expensive ; it might discourage applied science, rendering it a less attractive and worth-while pursuit. The industrial community was now, however, far more amenable than hitherto to scientific influence, and was indeed often the instigator of minor advances. This new epoch of concerted industrial research dated from the end of the war. It had been rightly stated that the training of the scientist included no awareness of the social consequences of his work. On the other hand, the training of the statesman and administrator contained no preparation for dealing with rapid scientific advance, nor did it envisage the technical forces which were shaping society. This crucial impact was at present nobody's business.

Social Reform

A research worker taking a broad outlook might dwell upon the practical applications of his research, or might think of its ultimate social consequences. Sir Josiah Stamp did not pretend to dogmatize as to how far the scientist should become a social reformer. It was still a matter for investigation whether the development of a specialist's thinking impaired or improved his powers of general thinking. He had observed that when the attempt to deal with the social consequences of scientific research was made, the thinker quickly found himself either in the field of larger politics debating the merits of the three prevalent forms of State government, or else performing miracles with fancy currencies, and blue prints reminiscent of the chemical engineer.

Two important aspects of the change brought about by science which were insufficiently recognized, and which made a profound difference to the direction of thought and inquiry, were the "balance of innovation" and the "safety valve of population." The invention of new objects of public demand brought together released labour and released purchasing power, and the most orderly and least disturbing phases of progress would result when these were properly balanced. The dislocations caused by labour-saving machinery could most easily be made good by a due balance of new labour-creating commodities. A natural increase of population was the best shock-absorber the community could possess, especially if accompanied by an extension of territory, as in the case of Britain in the period of over-seas emigration. The problem before all Western industrial countries was the fact that their populations were becoming stationary. The impact of science upon a stationary population was likely to be more severe than in the case of a growing population. A stationary elderly population must be very inflexible to change, and the stream of new young life was not so adaptable as it should be, the younger members of the community disliking departure from home, even in pursuit of better wages. A high percentage of unemployment was part of the price paid for the higher standard of life secured by those who retained employment, and only part of this difficulty could justly be attributed to advancing science. With a mentality adjusted for change society could advance much more rapidly.

Benevolent Dictatorship

It had been computed that a benevolent dictator, by applying modern dietetic knowledge, could at a relatively small cost add some two inches to the average stature and seven or eight pounds to the average weight of the population, besides enormously increasing the resistance to disease. Most people, however, preferred to govern their own lives indifferently rather than to be ideal mammals under orders. It had been ironically remarked that the giving of milk to necessitous children had not been a considered social reaction for its own sake, but only the by-product of an attempt to please the Milk Marketing Board by reducing the surplus stocks of milk in the interests of the producer. The price of pace was peace, and man must move by stages in which he enjoyed for a space a settled idea, the inevitable delay evoking sectional scientific scorn. A wise central direction would provide additional financial resources for the biological and human sciences rather than for the applied physical sciences. Many hard-boiled experimental scientists in the older, and consequently the productive, fields looked askance at the newer border-line sciences of genetics, eugenics and human heredity, psychology, education, and sociology ; these still remained, therefore, the happy hunting ground of faddists and cranks. Scientifically, leisure was an almost unexplored field. There could be little doubt that with the right applications of experimental psychology and adjusted education the mind of man would become still more adaptable. Clinical medicine was still too hesitant in accepting the newer scientific discoveries ; half-verified theories ran riot as medical fashions, to peter out gradually in disillusionment. A central clearing-house of inventions to co-operate the scientific, social, and industrial phases of invention might evolve also a code of ethics which would bring the light of scientific research to illuminate them, and would enable them to be applied more effectively to modern corporate relationships.

Fatigue in Industry

The Section of Physiology devoted the morning of Thursday, September 10th, to a discussion of fatigue in industry. The opening speaker, Dr. H. E. COLLIER, reviewed the clinical aspects of the subject, and pointed out that the study was still in a state of confusion, having been hitherto approached from three independent standpoints—namely, those of the physiologist, the psychologist, and the industrial engineer, without any proper relationship having been effected. The physiological manifestations, the psychological feelings, and the economic results were all aspects of a deeper unity which should be investigated by the industrial clinician, who, aided by the specialists concerned, should be able to recognize the existence of the fatigue syndrome, to distinguish industrial from non-industrial fatigue, and to indicate the probable sources of fatigue wherever it occurred. The cure and prevention of fatigue in industry would be achieved by the combined efforts of the experts concerned. Dr. Collier described a scheme for the practical diagnosis (personal and collective) of fatigue in modern industry. He discussed certain special causes of fatigue which were often overlooked, and explained the principles underlying the method of diagnosis.

Dr. H. M. VERNON said that the physical fatigue experienced by industrial workers depended on the length of time for which they had to work, the character of their occupation, and the conditions under which it was performed. Hours of work had been greatly improved after the war, when the working week had been cut down from 52–55½ to 47–48 hours in most occupations, but some groups of workers continued to suffer from over-fatigue caused by excessive hours of work. The majority of coal miners still worked eight-hour shifts, many bakers from 70 to 80 hours a week, while shop assistants and employees in the distributive trades frequently worked for unduly long periods. If the labour was of a heavy character the induced fatigue could often be lightened by the introduction of rest pauses at regular intervals. Reduction of fatigue could also be effected by the adoption of the most suitable movements of an easy and rhythmical character. Suitable environmental conditions were very important. Good lighting might substantially increase the quantity and quality of the results produced. Insufficient heating caused cold fingers and diminished manual dexterity ; excessive heating, especially if accompanied by inadequate ventilation, caused extra fatigue and diminished production. Excessive noise had adverse effects, both subjective and objective. In addition to its direct consequences, reduction of fatigue acted indirectly by diminishing liability to accidents. While good progress had been made in recent years in adopting measures for reducing fatigue, much still remained to be done. The principle of the 40-hour week, with maintenance of the worker's standard of living, had been adopted in 1935 by the International Labour Conference at Geneva.

Evolution of Blood Groups

Professor R. RUGGLES GATES, F.R.S., read a paper in the Section of Anthropology, on Thursday, September 10th, on blood groups, which, he said, were generally regarded as being of mutational origin and non-selective. Their spread in different races must depend, therefore, on mutation frequency, migration, and racial crossing, unless they were linked to racial characters which had a selective value. The A and B groups occurred also in anthropoids, but it appeared probable that they had arisen independently as parallel mutations in man. This view was partly based on the fact that the chimpanzee and gorilla, which were regarded as being the nearest relatives to man in the animal kingdom, had hitherto shown the A group only and not the B group. The primitive condition appeared to be O, from which the A group first and later the B group had evolved as mutations. That A was the older group had been shown by its high frequency in Australian aborigines, the pre-Dravidians of India, Bushmen, Lapps, and Hawaiians ; B began to appear later in East and South Asia, and in Africa. The fact that American Indians and Eskimos of pure blood were nearly all of the O type had been difficult to explain, but peoples of similar physique, such as the Tso of Formosa and the Tungus, had a high percentage of O, and might represent an ancestral type. The few Tibetans tested had proved, however, to have a very high percentage of B.

Chemistry and the Community

The Section of Chemistry opened its proceedings on Thursday, September 10th, with the presidential address of Professor J. C. PHILIP, F.R.S., who dealt with the training of the chemist for the service of the community. Mr. C. J. T. CRONSHAW surveyed the benign gifts of organic chemistry. He said that the discovery of mauve by Perkin, and his commercial exploitation of his invention, had revealed to the world the possibilities of this branch of chemistry, upon which Germany had gradually erected a great and progressive industry. The uses of colour in the modern civilized world were so varied that it was difficult to realize the meagre use made of colour before 1870. The success of the dyestuffs industry had shown very clearly the importance of organic chemistry in modern civilization. The practice of medicine had been enriched by it ; the whole range of local anaesthetics, many of the sleep-inducing compounds, and the sole remedy for sleeping sickness were the results of this molecular architecture. Modern photography, particularly as regards the developers and sensitizers, was the gift of this branch of chemistry. The ubiquity of the motor car with its fuel and its tyres was a derived benefit, and the recent work on detergents and vitamins had been instigated by organic chemistry.

Sir HENRY DALE, F.R.S., discussed the training of chemists for work in the fields of biochemistry and medicine, pointing out how in recent years chemistry had newly and rapidly invaded the fields of functional biology and the sciences related to medicine. Even in the study of the complex phenomena of immunity the results of recent years had shown a beginning of exact description in terms of organic and physical chemistry. Until about 1920 only some four hormones were known as separate entities, and of these only two had been chemically defined. In the last few years a whole series had been chemically isolated, and several had been made artificially by synthesis. Of the vitamins known a few years ago only by the effects produced by their absence, four or five had been chemically identified, and at least three had been artificially prepared. Sex hormones, one vitamin, carcinogenic substances, and heart tonics had all been chemically related to the typically inert sterols. New synthetic compounds of chemotherapeutic value gave promise of control over some of the most deadly infections of man, particularly in the Tropics. The whole orientation of therapeutics was being shifted from the effects to the causes of disease. Sir Henry Dale suggested that this new and increasing domination of biological and medical research by chemical methods and ideas represented the greatest of all the services of chemistry to the community. It called for chemists of the highest ability, so trained as to be able to co-operate fully with those trained primarily in biology and the other medical sciences, and to share with them the planning of future progress in the prevention and relief of human diseases.

MEDICAL PROBLEMS OF EAST AFRICA

The report is published of the Conference on Co-ordination of General Medical Research in East African Territories held at Nairobi from January 20th to 22nd, 1936. The object of these conferences is to pool results obtained, to compare conditions in the several colonies, and to collaborate in the planning of future research work. The conference was held under the chairmanship of the Director of Medical Services of Kenya, and delegates attended representing Kenya, Belgian Congo, Nyasaland, Sudan, Tanganyika, Uganda, and Zanzibar. Of the eighteen appendices two are of special interest. In one a scheme is outlined for the formation of a colonial laboratory service, with the establishment of a central laboratory in the United Kingdom under the control of a director-in-chief. This official would control the main programme of research to be carried out in the laboratories of the various colonies, each staffed by a local director and a team of research and routine officers. The provision of such a scheme, which could be financed by the local governments concerned with the probable addition of contributions from bodies such as the Rockefeller Foundation, would organize and co-ordinate research and bring workers in colonial laboratories into a closer touch with scientific leaders at home.

Yellow Fever: Insects in Aircraft

Another appendix deals with the question of insects in aeroplanes, especially with regard to the possible spread of yellow fever to countries where it is not endemic. *Aedes aegypti*, the natural insect vector of the disease, is widely prevalent in Kenya, Uganda, and the Sudan. In view of the fact that a case of yellow fever occurred at Wau, in the Bahr-el-Gazal province of the Sudan, in 1934, the possibilities of its extension from endemic areas in West Africa are obvious. Should the disease establish

itself in East Africa, where climatic conditions in the lower regions are favourable and the populations have no acquired immunity, the outbreak of devastating epidemics would be a strong probability, while air transport might be the means of conveying infected insects to distant places in the course of a few hours.

For this reason the authorities have already taken stringent precautions, and aerodrome hotels and restaurants have been mosquito-proofed. The de-insectization of the machines themselves is, however, a matter of difficulty. Spraying has been the method generally in vogue, but the results are not sufficiently complete. From experiments performed the report concludes that routine fumigation of aircraft with hydrocyanic or similar gas, the adoption of mosquito traps for disembarkation of passengers and luggage, and mosquito-proofing of doors and windows of aeroplanes are the preventive measures indicated. The first two could be rendered superfluous by making aerodromes insect-free, and, with this end in view, it is advised that immediate steps should be taken to arrange for complete sanitary and mosquito surveys of all aerodromes in tropical Africa.

Tsetse Fly Control

A report has also been issued on the Conference on Co-ordination of Tsetse and Trypanosomiasis (Animal and Human) Research in East Africa, held at Entebbe in Uganda from January 29th to 31st, 1936. The delegates included representatives from Uganda, Tanganyika, Kenya, Sudan, and the Belgian Congo, among whom were medical and veterinary officers, pathologists, bacteriologists, and entomologists. Following a report of the proceedings of the conference, dealing with the past progress and future programme in research, are fourteen appendices. One of these, devoted to the control of the tsetse fly, is a report on *Glossina morsitans* eradication in the south Ankole district of Uganda. The method adopted was to clear the bush in the regions where the fly was most plentiful, and to thin the bush in intervening areas by means of controlled grass fires, with a view to rendering the whole district too open for the tsetse fly to inhabit. These methods were unremittingly carried out for two years with considerable success. In the third year, during the absence on leave of the officer in charge of operations, a reinfestation occurred in one area. This was due to the activities of a native poacher, whose persistent harrying of herds of eland and water-buck drove the animals to cross a 5,000 ft. ridge of mountains into this area, bringing the fly with them. Other difficulties encountered were food shortage affecting local labour, and circumstances which detracted from the efficiency of the grass firing—namely, swarms of locusts which damaged the grass land and unauthorized or premature firing in certain districts. Nevertheless, the results obtained are highly promising for the future, and it is hoped that a combination of destructive firing, catching, and the forces of nature militating against artificially reduced species will eradicate the fly throughout the greater part of the originally infested region.

The reports of these two conferences are issued by the Government printers, Nairobi, Kenya Colony.

R. Orlando (*Rev. Med. Latino-Americana*, March, 1936, p. 643), as the result of his clinical and histological researches, comes to the following conclusions: (1) The medullated fibres of the iris in subjects of general paralysis with the Argyll Robertson pupil present severe lesions which may lead to their entire disappearance. (2) These changes in the absence of retrograde changes in the short ciliary nerves may be regarded as the consequence of a process which destroys the myelin with preservation of the axis cylinder, similar to what takes place in the cortical fibres in general paralysis. (3) It is possible, though further investigations are required to prove it, that this phenomenon is due to a myelinolytic toxin or ferment contained in the aqueous humour in view of the fact that this fluid often shows reactions in syphilis of the nervous system.

Scotland

Incapacitating Sickness Among the Insured Population

The fifth annual report on incapacitating sickness among the insured population of Scotland deals with the medical certificates received by all approved societies operating in Scotland from July 1st, 1934, to June 30th, 1935. The number of completed cases of incapacity was 16 per cent. higher and the total days of sickness 10 per cent. higher than in the previous year. These increases are attributed largely to the outbreak of influenza which occurred in the early months of 1935. The average annual number of cases in both sexes per 1,000 insured persons during the five years in which the reports have been published was 232, with an average duration of illness lasting 46.7 days and incapacity for work per person of 10.37 days. These figures were all lower for males than for females, and much lower among single than among married women. These morbidity statistics, the report states, clearly indicate a level of health and physical fitness very much below what it should be. It is urged that there is need for research into environmental factors with a view to their removal, and also a need for the institution of speedier and more effective means of treatment—for example, facilities for orthopaedic treatment—and for supervisory services to reduce the length of incapacity.

The total intimations of incapacity during the year numbered 395,399, of which 253,552 related to males and 141,847 to females, giving equivalent rates per 1,000 of the insured population of 234, 223, and 257 respectively. The total number of days lost by sickness was 18,578,578, which is equivalent to 11 days of sickness per insured person, or to the continuous incapacity of some 50,000 persons over the whole twelve months. With regard to the average duration of incapacity, the figure for both sexes in 1934–5 was 46.99 days, which showed a considerable decrease as against the figure for the previous year, 49.47, but a rise as compared with 1930–1, in which the average duration was 45.05 days.

Causes of Incapacity

Respiratory diseases, including influenza, accounted for 42 per cent. of the total number of cases of incapacity and 21 per cent. of the total number of days of sickness. Rheumatic conditions came next, accounting for 11 per cent. of cases and 12 per cent. of total days of sickness. Diseases of the digestive system accounted for 10 per cent. of cases and 10 per cent. of days of sickness. Accidents and skin conditions including sepsis were next in order of frequency. There was some difference between the sexes in the relative importance of different causes. Thus among females the frequency was higher in regard to anaemia, nervous debility, neurasthenia, disordered action of the heart, appendicitis, tonsillitis, infectious disease, skin disease, kidney disease, and tuberculosis, while among males there was a greater frequency of accidents, peptic ulcer, cerebral haemorrhage, sepsis, rheumatism, bronchitis, and pneumonia. Males showed a higher average duration as well as a higher incidence in respect of bronchitis and pneumonia. The influenza figures were remarkable for the fact that while the incidence rates were almost identical in the various groups the average durations varied considerably for men, all women, single women, and married women, these groups giving respectively 13, 17, 22, and 16 days of incapacity. Age had a marked effect upon duration of incapacity, there being a progressive increase with age in the time lost through sickness, and at each age the time lost among women exceeded that among men. The days of sickness per person from all causes rose steadily from 4.4 days under 20 to 41 days over 60.

As regards the incidence in burghs, the highest rate was in Hamilton with 306 cases per 1,000 insured persons, and the lowest in Greenock with 159. The average incidence for all burghs was 226 cases as compared with 245 in counties. Incapacity varied according to occupation from

164 cases per 1,000 among domestic servants and 195 among shop assistants and clerks, to 238 among textile and paper makers, and 381 among workers in coal and shale mining, quarries, etc.

Statistics have been prepared showing the proportions of chronic incapacities in various approved societies, and for all societies the average ratio is about 17 per 1,000 members, but different societies show wide variation, some having under 10 chronic cases per 1,000 members, and a few having over 35. The highest figures for chronic invalidism were in respect of nervous diseases, mostly insanity, with a total of 6,442 cases, tuberculosis with 3,290 cases, and circulatory disorders with 3,489 cases.

Health of Scotland

The annual report of the Registrar-General for Scotland for the year 1935 shows that the estimated population of Scotland at the middle of the year was 4,952,500, including 2,385,000 males and 2,567,500 females. This represented a net increase over the previous year of 18,000, due mainly to excess of births over deaths, and also to a small inward balance in the figures of oversea migration. The principal features of the year's statistics were that infant mortality and mortality from tuberculosis were the lowest ever recorded, while the trend of the birth rate was still towards decline. The general death rate was slightly higher than the rates recorded for 1934 and 1923, but was otherwise appreciably lower than the average. The number of births registered during the year was 87,928, being 908 less than in the previous year, and giving a birth rate of 17.75 per 1,000, which is practically half the rate recorded sixty years ago. Deaths from all causes numbered 65,331, which was 1,590 more than in 1934 and gave a rate of 13.19 per 1,000 as compared with 12.92. There were 6,754 deaths of children under 1 year, or 147 fewer than in the previous year, giving an infantile mortality rate of 76.8 per 1,000 live births, which was lower than that of 1934, the previous record. Deaths from malignant disease continued to increase, and gave a rate of 157 per 100,000, accounting roughly for 12 per cent. of the total deaths. Deaths of mothers from causes connected with pregnancy and childbirth numbered 554, giving a rate of 6.3 per 1,000 births as compared with 6.2 in the previous year. With regard to infantile mortality it is pointed out that up to 1915 this rate was invariably over 100, but that since that year it has only three times exceeded this figure. The rate was as usual highest in the large burghs, where it was 86, while in the small burghs and in landward areas it was 65. It ranged from 98 in Glasgow and Inverness to 56 in Dunfermline, and in the counties, exclusive of burghs, from 109 in Nairn to 26 in Orkney. The principal epidemic diseases accounted for 3,319 deaths as compared with 3,416 in the previous year. Of these no fewer than 1,459 were attributed to influenza ; whooping-cough accounted for 567, diphtheria for 513, scarlet fever for 199, measles for 141, and cerebro-spinal fever for 114, the latter being the lowest number of deaths from this cause since 1925. Malignant disease caused 7,793 deaths, or 11.9 per cent. of the total deaths, being 232 more than in the previous year. The most frequent site of this disease in both males and females was the digestive system. Diseases of the circulatory system, chiefly heart disease, were responsible for 13,969 deaths, or 1,151 more than in the previous year. It is pointed out that the increase in the number of deaths from this cause has been considerable in recent years, and that such diseases are by a long way the most important cause of death, followed by malignant disease. There were 8,591 deaths from diseases of the respiratory system, excluding influenza and tuberculosis, or 468 more than in the previous year ; of these more than half were due to pneumonia. Diseases of the digestive system, apart from malignant disease and tuberculosis, caused 3,660 deaths, an increase of 127 on the figure for 1934.

A special appendix to the report deals with the decline in the death rate from tuberculosis, and points out that sixty years ago between 15 and 16 per cent. of all deaths were due to this disease, while in the five years ending 1930 the percentage had fallen to 7.1. In 1935 deaths from all forms of tuberculosis numbered 3,646, the lowest recorded, giving 6.3 per cent. of the total deaths. The proportion of pulmonary tuberculosis to all forms of the disease has not greatly altered, having remained about 70 per cent. Mortality from non-pulmonary tuberculosis concerns chiefly the youngest age groups. The total death rate from tuberculosis varies widely at different periods of life, in infancy being only 2 per cent. of all deaths, but increasing to 40 per cent. between 15 and 25 years, and 30 per cent. between 25 and 35, thereafter rapidly declining in importance.

Cancer Control

The third report of the Cancer Control Organization for Edinburgh and South-East Scotland states that modern methods of radium and deep x-ray therapy, whether ancillary to surgical treatment or not, have greatly increased the prospect of cure in cases of a suitable type. This organization is collaborating with other bodies in evolving a scheme for bringing these methods of treatment within the range of all classes of the community. Summaries are given of two excellent lectures to practitioners, dealing with cancer of the alimentary tract and swellings of the breast ; in both cases emphasis is laid upon the importance of early diagnosis. The greater part of the report is devoted to very complete statistical tables, covering the subsequent histories of cases of malignant disease treated in the Edinburgh Royal Infirmary. In these tables the individual organs affected by cancer are treated separately. In each case it is possible to see at a glance the survival rates after each year up to five years following the various forms of treatment—namely, surgery, radium, x rays, surgery and irradiation, and radium and x rays. The tables, besides affording a rapid means of comparing the results of the different forms of treatment, show clear evidence of the importance of early diagnosis.

England and Wales

Hospital Developments at Bath

The Royal Mineral Water Hospital at Bath (henceforth to be known as the Royal National Hospital for Rheumatic Diseases) is celebrating the two hundredth anniversary of its foundation by Beau Nash by entering on a large project of rebuilding. The present building is unsatisfactory both in position and in structure, and in return for the site the Bath Corporation has offered a site four times as large and somewhat nearer the hot springs. Here it is hoped to raise and equip a modern building at a cost of £200,000, towards which £50,000 has been given or promised already provided building operations begin by January, 1938. The hospital at Bath, one of whose early presidents was the great Earl of Chatham, who was accustomed to repair to the spa when "devoured by gout and disappointment," was built for "those of the sick and poor to whose cases these (Bath) waters are applicable," and throughout its history it has largely concentrated on the treatment of rheumatic affections. The frontispiece to the brochure issued in connexion with the Governors' appeal is a reproduction in colour of the painting by William Hoare showing Dr. Oliver and Mr. Peirce examining patients afflicted with paralysis, rheumatism, and leprosy, while a sketch of Bath Hospital appears in the background. The picture is dated within a few months of the hospital's foundation. The new hospital will have increased accommodation for patients, and will be properly provided with verandas, treatment baths of the latest type using the water of the springs, and wards designed on modern lines. It is also proposed to enlarge the research department. Financial assistance by the Medical Research Council and by a member of the Hospital Committee has recently enabled the governors to secure the additional services of a distinguished investigator for a period of four years, and it is hoped to extend this work and put it on a permanent basis. There is also a well-equipped pathological department, in conjunction with which the clinical staff carry

out useful research. The list of patrons of the appeal includes a number of highly distinguished names, the medical profession being represented by Viscount Dawson of Penn, Lord Moynihan (who wrote a special message pointing out that this local effort demands more than local support), Lord Horder, Sir Humphry Rolleston, and Sir Farquhar Buzzard. The word "national" in the new title is no mere figure of speech. It is stated that the 1,198 patients received during 1935 came from more than fifty counties in the British Isles. Somerset, the home county, contributed only 7 per cent., over 17 per cent. came from London, and 30 per cent. from South Wales, from the mining districts of which the greatest demands for in-patient treatment have been made in recent years.

Cancer Research at Leeds

The annual report of the Department of Pathology and Bacteriology of Leeds University for 1935 includes an abstract account of experimental pathology and cancer research. With regard to experimental tumours it is suggested that the site of their appearance may be determined by induced defects in the local circulation. By the injection into animals of an innocuous dye it has been possible to detect skin areas showing a change in tissue reaction, especially towards the acid side. The results of these experiments suggest that tumours appear in close relation to areas of skin showing an acid reaction, presumably from inadequate removal of metabolites in consequence of a diminished blood supply. Other experiments lead to the conclusion that in cases where metastases are common the accompanying anaemia may result from hyperplasia of the leucopoietic elements of the bone marrow. Evidence is brought forward to suggest that this hyperplasia is a result of the absorption of products of necrosis from widespread cancer foci. Interesting results were obtained from a study of the course of glycolysis in muscle extracts, and it is intended to extend these observations to the glycolysis of tumour tissue. Other experiments include an investigation of the value of colchicine in the treatment of cancer in domestic animals, and a chemical investigation of betel-nut cancer.

Dr. Noel Bardswell

Dr. N. D. Bardswell is due to retire from the public health department of the London County Council on reaching the age limit on December 20th next. As already announced in these columns he has been invited by the National Association for the Prevention of Tuberculosis to undertake important work in the formulation of a scheme for an anti-tuberculosis campaign in Cyprus, and with this in view he has been allowed to postpone his annual leave and granted additional leave of absence in order to enable him to relinquish his duties with the Council on about October 20th. The Hospitals and Medical Services Committee of the Council states that Dr. Bardswell may be regarded as one of the pioneers of sanatorium treatment in this country. At the time of his appointment in 1905 by the Metropolitan Asylums Board as medical superintendent of King Edward VII Sanatorium, Midhurst, sanatorium treatment was, practically speaking, not to be obtained in England, and tuberculosis patients were generally sent to sanatoria in Germany, Switzerland, and such places as Madeira. The L.C.C. was therefore very fortunate in securing at the earliest stages of the development of its tuberculosis service one of the most widely experienced and best-known experts in this country, and the committee has placed on record its appreciation of the valuable services he has rendered to the Council.

Improved Maternity and Dental Services at L.C.C. Hospitals

In view of the constantly growing volume of maternity work at the London County Council's hospitals, it is proposed as an experimental measure for twelve months to appoint part-time obstetricians and gynaecologists at four of the Council's hospitals—namely, Dulwich, Lewisham, St. Giles', and St. James's—at which the largest maternity units are situated. At present the work at these units is in charge of a senior assistant medical officer, the services of consultants being, in addition, available as required under the consultant scheme. The new proposal means that, instead of this arrangement, two part-time obstetricians and gynaecologists (one for duty at two of the hospitals and one for duty at the other two) would be appointed, and would, subject to the administrative control and supervision of the medical superintendent, be responsible for the whole of the obstetric and gynaecological work at the hospitals to which they are attached. For this purpose they would be called upon to visit each hospital daily, including Sundays, if necessary and as required. The remuneration proposed is £800 a year. It is also considered that improvements are needed in the arrangements for dental treatment, and the employment of a whole-time dental surgeon at St. Alfege's and St. Stephen's Hospitals is proposed, also for a twelve-months experimental period in the first instance.

CORRESPONDENCE

Treatment of Hallux Valgus and Rigidus

SIR,—In your issue of August 22nd Mr. J. McCullagh (p. 404) claims that excision of the base of the proximal phalanx of the great toe has several serious disadvantages that Mr. T. P. McMurray failed to mention in the excellent paper (August 1st, p. 218) which he read to the Section of Orthopaedics at the Annual Meeting. From my own experience I would say that these disadvantages were not mentioned because they are rarely encountered by surgeons with experience of this (the Kellar) operation. Let me deal with Mr. McCullagh's "disadvantages."

1. Loss of power and shortening of the great toe—some shortening of the great toe is obviously unavoidable when half, or nearly half, of the proximal phalanx has been excised, but the final shortening of the toe should not by any means equal the length of the excised portion of phalanx. In my experience the shortening is seldom more than half an inch ten weeks after the operation. I obtain this result by applying a figure-of-eight bandage firmly over padding round the toe and round the foot over the anterior halves of the metatarsals while an assistant pulls the toe out to its full length. The figure-of-eight bandage immobilizes the toe in moderate abduction (from the long axis of the foot), exercises firm compression on the cavity left after excising the proximal half of the phalanx, and helps to restore the dorsal convexity of the transverse metatarsal arch. The tip of the toe is left exposed, so that excessive pressure by this bandage is at once obvious. It remains untouched for a fortnight; no splint is used. I can only guess what Mr. McCullagh means by "dangle-toe," but with good after-treatment—in the form of massage, exercises, re-education in walking—and properly shaped footwear I have not observed any loss of power in flexion or extension of the toe except through the inevitable but moderate shortening. I would even say that compared with the pre-operative condition of the toe there is usually well over 100 per cent. gain in power and a very good psychological effect on the patient.

2. Pain in the region of the head of the first metatarsal bone persists, in my experience, only in a very small proportion of cases after thorough trimming of osteophytic outgrowths from the dorsal three-quarters of the circumference of the head. Where pain does persist I agree that it is almost always due to arthritic changes on the dorsal surface of the sesamoids. But I think this is a rare finding except where there has been a former fracture of a sesamoid in younger patients or where very advanced arthritic changes in the entire joint have occurred in older patients. A good skiagram will usually give some warning of such a condition, and in these cases alone would I perform the Mayo operation.

3. Recurrence of osteophytic outgrowths will very seldom appear if irritation of the remoulded metatarsal head is avoided. This is not difficult if re-education in walking is successful in preventing an excessive proportion of the weight

being borne on the inner side of the forefoot and if well-made footwear, with a straight inner margin as far forward as the tip of the great toe, is worn.

The great objection to the Mayo operation is that, as emphasized by Mr. McMurray, it involves removal of the anterior pillar of the inner portion of the longitudinal arch and the medial pillar of the metatarsal arch, and the foot is accordingly greatly weakened. Further, Mr. McCullagh states that he always removes "the head and enough of the shaft to avoid further irritation of the sesamoids." This can only mean that, when weight is borne "on the gap," the sesamoids must be displaced upwards into it. I cannot believe that the flexor hallucis brevis is strong enough to withstand this strain, and hence the weight will merely fall on the edge of the cut metatarsal shaft and on the heads of the other metatarsal bones, the "dropped" position of which is a well-known source of discomfort and disability. In my opinion the Mayo operation should be reserved for patients who have a sedentary occupation and no desire for active physical recreation.

Like Mr. McCullagh, I write in the hope that other orthopaedic surgeons will join in this discussion.—I am, etc.,

ROBT. W. AGNEW, M.Ch.(Orth.),
Glasgow, Aug. 26th. F.R.C.S.Ed.

SIR,—Mr. McCullagh's letter (*Journal*, August 22nd, p. 404), with its very pertinent questions on the treatment of hallux valgus and hallux rigidus, reopens an interminable but important discussion. What are the relative merits and demerits of excision of the proximal half of the proximal phalanx (for shortness referred to as Kellar's operation) and excision of the head of the metatarsal (Mayo's operation)? Since the discussion has continued for over thirty years the balance in favour of either must be rather small.

Before comparing the two operations as I see them it is worth while stressing some points from Mr. McMurray's paper (August 1st, p. 218) and mentioning others; most important of all is that the two conditions present two very different problems.

1. Hallux rigidus is more commonly seen in young patients—adolescents and young adults—and is usually the sole deformity. The condition of the feet prior to operation, their reaction to its trauma, and the amount of bone regeneration afterwards will therefore be different from

2. Hallux valgus, which is more commonly seen in the older patient, and is seldom unassociated with metatarsal flat-foot, the formation of exostoses on the metatarsal head, and other foot deformities.

No one, particularly myself, who am his pupil, would wish to contradict Mr. McMurray's assertions without due reason, for his experience is profound. But the following figures make it difficult to believe that in hallux valgus the valgus deformity is primary and the metatarsal collapse secondary.

Since early May we have held orthopaedic clinics at the East Lancashire Foot Hospital (for Chiropody), where the total attendance is from 300 to 400 a week. I choose this hospital from which to obtain my facts because all the patients have been examined by one person, and have therefore been classified by one standard. The patients who attend the hospital have symptoms which they, or their doctors, refer to the foot. All cases which are beyond the scope of pure chiropody, or for which a surgical opinion is desired, are referred to my clinic. I am thus able to see a very large number of "foot cases," and the results of my examinations have been interesting. Of the 183 patients seen a very large proportion are women. Whether this indicates that about fifteen women have foot complaints for each one man or that the women have more time in which to seek relief I do not profess to know. Eighty of these patients interest us in this discussion; there were 165 lesions, or over two in each patient, combined as in the following table.

Group	1	2	3	4	5	6	7	8	9	10	11	12	Total Lesions
Metatarsal flat foot	+	+	+	+	+	+	+						48
Hallux valgus				+		+		+		+			30
Metatarsal exostosis					+	+			+	+			31
Hallux rigidus							+				+		18
Metatarsalgia		+										+	8
Other conditions...			+	+	+	+	+	+	+	+	+	+	30
Total patients per group (80)	6	3	8	3	4	19	5	4	4	4	13	7	165

In Group 1 there are six cases with only metatarsal collapse; in Group 2 three cases have both collapse and pain. Group 6 shows that nineteen patients had metatarsal collapse, hallux valgus, and metatarsal exostosis. The sum of Groups 1 to 7 gives forty-eight cases of metatarsal collapse, of which (Groups 4 and 6) twenty-two had hallux valgus.

Figures can be made to prove anything, but it is more than suggestive that the numbers of metatarsal flat-foot exceed those of hallux valgus (however slight that deformity is) by 60 per cent., while there were eight cases out of the thirty of hallux valgus without metatarsal collapse and thirteen out of the eighteen of hallux rigidus. Clinically the metatarsal collapse was always marked while the valgus deformity was often only slight. A very large proportion did not complain of the valgus deformity. It is simply noted in my case records as being present. Further clinical observation has shown me that the average shoe worn to-day by men cannot deform the great toe, while in most women's shoes it is extremely doubtful that it does—as a primary factor. (This is not the same as saying that a woman may continue to wear the same shoes.) Nor is it likely that modern silk hose is strong enough to deform the toes. But it is clear that in women at any rate, metatarsal collapse is inevitable with those same shoes which, with their raised heels, throw all the body weight forward on to the metatarsal heads.

The very important point brought out by the figures is that thirty-one of the forty-eight cases of hallux valgus and hallux rigidus already had metatarsal flat-foot before operation. It is, to say the least of it, dangerous to lay the blame for this collapse, when seen after an operation, on the operation itself unless one is absolutely sure that it was absent beforehand.

In the operative treatment of hallux valgus our object is to correct the malalignment of the great toe and to excise the bursa and exostosis when present. Either of the two types of operation corrects the malalignment. Mayo's removes the exostosis at the same time, while in Kellar's it is a separate step in the operation. Mr. McCullagh's contention that unrelieved pain is due to osteo-arthritic changes of the sesamoids may be true. Very few of us ever see them. But one feels that even after Mayo's operation they must "migrate" backwards as the tendons take up the slack which the proximal displacement of the phalanx allows. If so they will again come into contact with the metatarsal and cause pain. Shortening of the toe is equal with either operation when one has removed sufficient bone. "Dangle-toe" occurs after either, but should not last more than six months. Incomplete movement in the false joint is unlikely. After both operations it is necessary to treat the metatarsal

collapse, if associated with symptoms, by means of a metatarsal "dome."

The aim of the hallux rigidus operation is to restore normal dorsiflexion of the great toe, to relieve the pain of the osteo-arthritis, and, in many cases, to excise the osteophytes which often surround the head of the metatarsal for three-quarters of its circumference. There is commonly a particularly large spike projecting from the outer side towards, and probably pressing on, the compound plantar digital nerve. This point is often especially tender, and the patient may complain only of pain in the second toe, when the deformity is hallux rigidus. Failure to remove this spike is a source of unrelieved pain. It is fortunate that osteophytes are not seen until the disease has been in existence for some years, and even then tend to be limited to the older patients of the group. Consequently remodelling of the head of the metatarsal, when necessary, is not very likely to be followed by renewed outgrowths, for the older patient does not regenerate bone so easily. But there may be very marked stiffness of the new false joint in the young because of this tendency to bony repair. It is not always to failure to remove sufficient bone that this unhappy sequel is to be laid. On this point Kellar's operation scores heavily, for it so shortens the leverage of the phalanx that the compensatory hyperextension of the interphalangeal joint provides sufficient total dorsiflexion to allow easy walking even if the false joint stiffens. The hallux rigidus toe is usually abnormally long. Kellar's operation shortens it. Mayo's merely moves it backwards, and we then have the peculiar appearance of an abnormally long great toe articulating at a level much posterior to that of the other toes. This curious relationship is also mechanically unsound.

Kellar's operation is less likely to be performed badly, so that on balance better results are obtained. Most of the bad results one sees have been Mayo's operation. Mayo's produces results equal to Kellar's operation in hallux valgus; for hallux rigidus Kellar's is the operation of choice, but surgery is still an art, and it is no admission of inability to analyse factors when one states that there is an instinct or sixth sense that prompts some of us to do one type of operation on one patient and another on the next, apparently identical, case.—I am, etc.,

W. SAYLE CREER, M.Ch.Orth., F.R.C.S.

Manchester 3, Sept. 5th.

SIR,—It is only with much hesitancy that I join in this ever-recurring correspondence regarding the relative merits of the commoner operations for the treatment of hallux valgus and hallux rigidus. In operating on a painful deformity the surgeon aims at correcting the deformity, relieving the pain, and, if possible, restoring the function which has invariably been impaired. Which of the operations recommended for the treatment of hallux valgus succeeds in fulfilling this ideal?

The only logical method of determining this, as Mr. Eric Lloyd pointed out (*Journal*, March 9th, 1935, p. 504), is to carry out the various types of operation and assess their value later by obtaining the patient's opinion as regards: (*a*) appearance; (*b*) comfort; and (*c*) function. In the case of hallux valgus only two operations need be considered—namely, the phalangeal and the metatarsal—and as the deformity is so often bilateral the surgeon is given the opportunity of carrying out each type of operation on one patient. During the last few years I have availed myself of this opportunity, and am now reviewing these cases. The following are my conclusions:

1. As regards appearance there is no doubt that the excision of the base of the phalanx does often leave an ugly-looking "dangle-toe" (as Mr. J. McCullagh says in the *Journal* of August 22nd, p. 404); and unless the breadth of the head of the metatarsal is very radically reduced the deformity still remains. With removal of the head of the metatarsal the toes soon fall back into their proper position, and the foot regains a normal appearance.

2. Comfort is attained by either operation, provided that sufficient bone is removed, and faradic baths and exercises for the short flexors and interossei are insisted upon afterwards to overcome the dropped anterior arch, which is so frequently associated with hallux valgus.

3. The function of the foot is restored by either operation, but whereas the patient is able not only to stand and walk comfortably, but also to run, climb, or dance without fatigue on what we may term "the Mayo foot," he, or she (as it more frequently is), complains of a certain slight disability when attempting to do anything strenuous on the other foot.

In my experience, therefore, the Mayo operation gives the more satisfactory result, not merely from the aesthetic point of view, but also from the still more important one of utility. This, at first, is rather surprising, for we all still regard with due respect the sanctity of the inner pillar of the transverse arch, and in theory agree with what Mr. J. W. Riddoch says (August 29th, p. 444) that "the breadth of the foot cannot safely be interfered with." However, when we consider that in all the really bad cases of hallux valgus the head of the metatarsal is the seat of osteo-arthritic changes, and is not only deformed but painful, we can understand how the replacement of such a damaged support by a painless new one formed by nature out of the sesamoids is bound to improve matters. The conclusion that Mr. Eric Lloyd came to—"that so long as you shorten the bony pier sufficiently it does not matter very much how you do it"—is, in my opinion, only half the truth. I would tentatively suggest the other half—that where the head of the metatarsal is greatly enlarged and tender nothing short of its removal or the marked reduction in its size laterally will give true comfort and a shapely foot of which the patient will not be ashamed. My practice now is to remove the head of the metatarsal bone in all cases of hallux valgus and to reserve the phalangeal operation for cases of hallux rigidus, which do not react to conservative treatment, including manipulation. The fact remains that upon whichever operation we decide so long as sufficient bone is removed we are practically certain to obtain one of the most satisfactory results in surgery.—I am, etc.,

Leicester, Sept. 7th. ROBERT S. LAWSON.

SIR,—I have been greatly interested in Mr. T. P. McMurray's address (*Journal*, August 1st, p. 218). These minor ailments are the cause of so much discomfort and incapacity that correct and efficient treatment is a matter of great importance.

For many years excision of the base of the first phalanx has been the operation carried out in our clinic at the Royal Victoria Hospital, Belfast, for the treatment of hallux rigidus. We do not find it necessary to remove more than a quarter of an inch of bone. As soon as the wound is closed extension should be applied to the phalanx and maintained for at least two weeks. This can be done with ordinary adhesive plaster, as the pull required is very slight. Needless to say, care must be taken to leave the raw surface of the phalanx as smooth as possible and to see that no loose particles of cancellous bone are left behind and that any irregularities around the head of the metatarsal are removed. The immediate result is a haemarthrosis; the blood clots quickly and firmly on the rough surface of the phalanx. At the end of a week the toe is very gently dorsiflexed to the full range once only. This is repeated daily or on alternate days for two weeks, after which use of the foot may be

permitted. I think I can assure Mr. McCullagh (August 22nd, p. 404) that he need have no fear of a "dangle-toe."

I congratulate Mr. McMurray on his suggested treatment of hallux valgus. I feel satisfied that no surgeon-anatomist can fail to realize that excision of the head of the first metatarsal bone is a very serious proceeding.

1. It removes the most important weight-bearing point once the heel is raised from the ground.

2. It destroys at one stroke both the longitudinal and transverse arches.

3. It is followed by a gradual twisting of the tarso-metatarsal joints.

I am aware that it is occasionally necessary, and that it is possible to walk wonderfully well after this operation. I do wish to urge that it should never be done except when nothing else will give relief.—I am, etc.,

A. B. MITCHELL, M.B., F.R.C.S.

Belfast, Aug. 31st.

Problems of Chance in Clinical Work

SIR,—Having occasion from time to time to use the methods and principles discussed by Professor Donald Mainland in his very lucid and practical paper on the above subject (*Journal*, August 1st, p. 221), I feel grateful to him for having brought so many useful and instructive points within the compass of an easily read article. Professor Mainland has dealt with equal chances. There is an aspect of this problem that has been the subject of controversy. I refer to the view that appears to be taken by Sir James Jeans in his book *The Mysterious Universe*, where he states (p. 28): "If we throw up a million tons of halfpence we know there will be 500,000 tons of heads and 500,000 tons of tails. The experiment may be repeated indefinitely, and will always give the same result."

It is not easy to see any justification for the view that in a single throw with very large numbers of coins an equal number of heads and tails will result. The mathematical probability of obtaining this result diminishes with increase in the number of coins, and in this particular case works out at about 1 in 530,600. While this is greater than the corresponding probability of any other of the combinations possible for this particular number of coins, it would only entitle one to say that an equal number of heads and tails is more likely to result than any specified one of the other combinations. On the other hand, it is less likely that an equal number of heads and tails will result than some unspecified one out of the aggregate of combinations possible.—I am, etc.,

Southampton, Sept. 3rd. A. GARDNER, M.B.

Medical Coroners

SIR,—It may well be that the opinion and experience of a coroner who happens to have practised both the professions of medicine and law will be of some interest to those who are considering which type of qualification is the more useful to one occupying the office of coroner. I have no doubt myself that the medical qualification is the more useful.

I trust that no effort will be spared by those who are in a position to bring influence to bear upon any appointing authority to keep the importance of a medical qualification to the forefront, and I feel that I have had some opportunity to arrive at my conclusion. I practised medicine for some six years and then went to the Bar. I practised at the Bar in criminal chambers for ten years and was fortunate enough to become a junior Treasury Counsel. I became a London full-time coroner after having been a deputy coroner for nearly ten years, and I have occupied that position for nearly six years. During the whole of the time of my association with the many questions which come before one so placed, I have never ceased to realize that it is medical knowledge which is the more important.

From the public point of view (and especially if there are sufficient suitably qualified candidates) a double qualification seems obviously advantageous, but I do feel that its utility can best be measured in terms of actual practice of both professions, and to my mind another important consideration is actual experience as a deputy coroner.

The proposal to concentrate upon legally qualified coroners seems at the moment somewhat inappropriate when one considers the recent report, in which the departmental committee suggests that it should be made clear that coroners' courts are not suitable tribunals to decide questions of legal liability. I cannot see what advantage the legal coroner can possibly have over a medical brother (or maybe a doubly qualified brother) if the only effective part of a coroner's use to the community in the future is to be concentrated on medical and not on legal matters—I am, etc.,

W. B. PURCHASE,
Coroner, Northern District, County of London.

Wimbledon, Sept. 1st.

Health of South African Natives

SIR,—The numerous articles and letters published in the *Times* during the past month dealing with the lamentable condition of natives, especially of African natives in areas under British administration reveal a widespread and justified feeling of dissatisfaction with the present position and a deep anxiety to remove its preventable causes—indeed, the apparent official indifference to this position constitutes a grave national reproach.

The attention of the British public was first drawn to this question, I believe, in the Chadwick Lecture delivered in London on April 28th, 1932, by Dr. J. H. Sequeira, for many years physician on the staff of the London Hospital and for the last nine years resident in Kenya. Dr. Sequeira pointed out in that lecture, at which I was present, that native backwardness, physical and mental, was in great measure due to preventable disease and he gave some notable figures supporting his thesis of its excessive prevalence among natives. Thus in some areas coming under medical inspection 94 per cent. of children under 10 showed symptoms of chronic malaria; in some districts 80 per cent. of the population were infested with hookworm—a medical officer called upon to select porters for a transport job had to examine 1,000 men before he obtained fifty fit to carry loads.

In November, 1933, Dr. H. L. Gordon of Nairobi, the distinguished research worker in mental diseases, addressed, at my suggestion, a meeting of Members of Parliament in the House of Commons, presided over by the present Colonial Secretary. Dr. Gordon stressed the mental backwardness of the African native, and urged the institution of an inquiry into its causes. The *Times* of November 25th, 1933, published a letter with important scientific signatures endorsing this suggestion. In January, 1934, a combined meeting of the East African Branches of the British Medical Association passed unanimous resolutions calling upon their respective Governments to undertake this investigation, for which an adequate personnel was available in Kenya. (In May, 1936, similar resolutions

were again passed by another combined meeting of the same Branches.)

In the autumn of 1934 the *Times* published three letters from myself on the subject, written from information furnished to me personally by Dr. A. R. Paterson, Director of Medical Services in Kenya, and urging the Colonial Office to make a grant for the scientific inquiry asked for by the whole medical profession in East Africa. I pointed out that local instructed opinion suggested three principal factors as being responsible for native backwardness.

1. Poverty, aggravated by relatively high local taxation (a point stressed by Sir John Harris in his article in the *Times* of August 12th, 1936).
2. Ignorance, especially of hygienic principles and relative food values; poverty and ignorance resulting in a dietary demonstrably insufficient to maintain health.
3. Prevalence of infective disease, especially of malaria, yaws, and parasitic infestation.

The remarkable effect of diet on physical development and prevalence of disease was demonstrated by an inquiry undertaken under the auspices of the Empire Marketing Board and described in a joint report by Dr. (now Sir) John Orr and Dr. Gilks of Kenya, published by the Medical Research Council in 1931. This report, which has not received the attention it deserves, summarized the work of several years, and showed the difference in physique of two African tribes—the Kikuyu and the Masai—occupying adjoining native reserves in Kenya. The Kikuyu are an agricultural community, living almost wholly on cereals with practically no animal food. The Masai are a pastoral people herding cattle, and live on meat, milk, and fresh blood drawn from the living animal. The average Masai adult male compared with the average Kikuyu adult male was five inches taller, 23 lb. heavier, and his muscular strength, estimated by the dynamometer, 50 per cent. higher. Infective disease, notably pneumonia, the predominant scourge of the native, was much more prevalent among the Kikuyu, an observation supported by recent work on nutrition, which assigns to certain foodstuffs a definite protective value against infection.

In July, 1935, I asked a Parliamentary question of the then Colonial Secretary, inquiring if a grant for the scientific investigation of the causes of native backwardness, repeatedly asked for by the medical profession in East Africa, could not be furnished. I received the answer that "no funds were available," but "the importance of the inquiry was recognized"; and it was suggested that action might be taken, but no undertaking was given, on the publication of the report of the African Research Survey then proceeding under Sir Malcolm (now Lord) Hailey. I repeated the question in July, 1936, and received much the same answer, with the added information that the African Research Survey was "quite independent of His Majesty's Government," being conducted by a private body, "financed by the Carnegie Corporation of New York," and the Colonial Secretary was "not in a position to say when the report will be published."

I have given this historical summary rather fully to demonstrate that the Colonial Office has for at least four years been fully informed of the position, and cannot expect that any evidence contradicting the universal opinion, expressed during those four years with cumulative force, will be forthcoming from the Hailey Research Survey. The pretext that the Colonial Office is waiting for the publication of a wholly unofficial report should no longer be allowed to delay the action which all qualified observers are agreed is urgently and immediately called for.—I am, etc.,

London, W.1, Sept. 3rd. E. GRAHAM-LITTLE.

Prevention of Tuberculosis

SIR,—My attention has been called to a reference in your issue of July 25th (p. 191) to my paper on the significance of the examination of contacts, given before the Association of the Prevention of Tuberculosis, in London, on July 16th. Several of my friends here have questioned me as to whether I stated that

"the effort to discover cases of phthisis was being directed away from the examination of contacts, whom it was difficult to persuade to attend for examination, and towards the more intensive case-finding represented by *x*-raying and/or tuberculin-testing groups of the population, such as school children, college students, and industrial employees."

This, of course, I did not say, and I am embarrassed by the summary which appeared in your columns. While it is true that I called attention to various efforts in different parts of the United States to extend case-finding procedures by tuberculin-testing and *x*-raying of special groups in the community, I had no intention to, nor did I, minimize the importance of the continuation of the examination of family contacts. Indeed, in the last paragraph of my paper I stressed the fact that so long as the fight against tuberculosis continues, "the examination of contacts will always bulk large as an important instrumentality in the accomplishment of our purpose."—I am, etc.,

FRANK KIERNAN,
Director, New York Tuberculosis and Health Association.

New York, Aug. 28th.

*** We much regret the apparent misrepresentation pointed out by Mr. Kiernan.

National Maternity Service

SIR,—In the report of the proceedings of the Annual Representative Meeting in the *Journal* of August 1st there is discussed the question of a National Maternity Service (*Supplement*, p. 82). As the Association's memorandum on the subject was unanimously approved it might be well to consider carefully just exactly what it is proposed to perpetuate as a national service.

Suppose a doctor, assisted by a midwife, were conducting a simple low or mid-cavity forceps application. First, the doctor would probably anaesthetize the patient, chloroform or chloroform and ether being given, since there is no anaesthetist to give gas and oxygen. Then after helping to move the patient into the left lateral, cross-the-bed position, he would proceed to scrub up, perhaps rather hurriedly. If he scrubs up in the bathroom the patient is out of his sight, if in the bedroom he is attempting to make his hands sterile in a bowl which is not sterile, and if the nurse changes the water she must leave the anaesthetic to do so. He may be called from his scrubbing to help to move the patient back into position, as the nurse may be a little diffident about giving the anaesthetic to the point of keeping the patient fully under. The nurse must now combine holding up the leg with one hand and giving the anaesthetic and holding on the mask with the other. The doctor will usually have no sterile towels, and household beds and feather mattresses are apt to sag in the middle and bulge up in other awkward places. It may be difficult to avoid touching the sheets with the forceps handles. At the traction stage the nurse has also to hold the patient on the bed and, as the majority of home confinements take place in a double bed, she may have to get into the bed with the patient. Patients are apt to be pulled out of the cross-the-bed position; often beds have a high lower end to them, so the doctor has to lean over the rail at the bottom of the bed, which does not make his task any easier. He is fortunate if the nurse is so skilful that the patient does not come out of the anaesthetic sufficient for her to kick and struggle for a few

seconds, during which the leg would have to be dropped, perhaps at a critical moment.

Can anyone say the above is not a true picture of what happens at a home confinement attended by a doctor and midwife when forceps are used? Yet this is what the Association desires to perpetuate as a national maternity service. It should be realized that more and more women demand the relief afforded by a low or mid-cavity forceps application, and, most important of all, that more and more women are entering nursing homes and maternity hospitals for their confinements. No scheme, whether sponsored by the Ministry of Health or by the British Medical Association, is going to alter this modern and future trend.

In Leicester last year approximately half of all the births took place in maternity hospitals and nursing homes. The routine, frequent bacteriological examinations of throat swabs from all attendants at labour, the enforcement of the use of masks, the provision of sterile towels and appliances: where can these be more advantageously and economically provided than in the maternity hospitals? Where can the prolonged relief by drugs be more effectively carried out than in a maternity hospital by a staff trained and accustomed to their use? Even an apparently normal case can produce the emergency of a post-partum haemorrhage from an adherent placenta. A properly equipped maternity hospital would have everything available for treatment almost at once, and would have its own organization of blood donors. Examples could be multiplied indefinitely.

I am not advocating routine forceps delivery ; but how many women would not prefer the relief that morphine and hyoscine, or nembutal, etc., can give in the wearying first stage, and the Minnitt gas-and-air apparatus in the second stage? All this can only be done under the supervision of a doctor, and to be a practical proposition for the country as a whole can only be carried out in maternity hospitals or nursing homes. To imagine that the maternity service of this country is going back to normal unassisted deliveries in the patients' own homes is simply to shut one's eyes to the progress that has already been made and to the ever-increasing trend to delivery in maternity hospitals. Surely the question resolves itself into an urban and a rural one. Instead of trying to formulate one single scheme to be made applicable to the country as a whole it would be better to realize that the needs of an urban population are quite different from the problems of a scattered rural area.

The maternity hospitals of Leicester serve an area with a fifteen-mile radius ; therefore, with a little organization, there need be few districts unserved. Maternity hospitals should be served by general practitioner specialists. At one stroke this banishes the fear of the British Medical Association of the maternity service of the country passing out of the hands of the general practitioner, and would go far to reassure Dr. Pooler that two classes of practitioner would not be created ; but they must be men of experience and prolonged training, and specialists at their job. The ideal would be men able to deal with every emergency in the correct, approved manner, and capable of doing Caesarean sections or operating on ectopic pregnancies. In practice, Caesarean sections, etc., would have to be done by a general surgeon in the smaller centres. It seems odd that general surgeons should do midwifery work. Except in the large centres the obstetric specialists are general surgeons, and I am certain that most of their interest lies in, and most of their income comes from, operative surgery and gynaecological work and not midwifery.

Midwifery demands great skill and patience, and the man to do it is the general practitioner specialist. Not all general practitioners would be included in the service ; not all would wish to be. There would be nothing to prevent a prospective mother from booking any doctor and having her baby in her own home if she chose. Ante-natal clinics would be run by these practitioner-specialists —the men who were going to look after the patients in the maternity hospitals.

Why not realize that the whole trend in midwifery nowadays is for more and more mothers to be delivered in hospitals, for more and more relief of the pains of labour, for more and more strict bacteriological supervision of the attendants on labour, and realize, too, that these things can only be achieved in maternity hospitals, and that the facility to deal with emergencies requires a specialist's service?—I am, etc.,

Leicester, Sept. 3rd. C. L. SOMERVILLE.

Teaching of Obstetrics

SIR,—I hope you will allow me to bring again to the notice of the profession a deplorable state of affairs.

After I qualified I did two house appointments at my hospital, but unfortunately neither was an obstetric one. I then went into general practice, and during my assistantship had to attend perhaps six normal deliveries. Just now, to refresh my knowledge of obstetrics, I have gone into residence as a post-graduate at a well-known teaching lying-in hospital in London. I have tried, as a student, and later as a resident at hospital, and again now, to be allowed to put on forceps in a suitable case, with, obviously, a guiding hand on mine. I have never been allowed to do this. I am shortly going into practice in a large country district, where expert help is miles away; I am qualified to be called in by a midwife in difficulty, and expected, as a doctor, to be an expert. I must gain my experience by practising, by myself, on difficult cases under difficult conditions. In twenty years, perhaps, I may be an expert. At present I am hopelessly incompetent.

The second case I saw at this hospital was one of the so-called " failed forceps." The mother was exhausted when she came in and the baby dead. After a terrific struggle the baby was delivered. The mother died the same day. Hard words were said in the hospital to the students and post-graduates about the doctor who sent the case in. I would like to protest against the system which allows a man to be called upon to deal with difficult cases when his experience and competence are *nil*. —I am, etc.,

London, Sept. 4th. M.B., B.CH.

Mechanized Medicine: A Plan

SIR,—Dr. E. K. Mackenzie of Tain (*Journal*, June 20th, p. 1273) takes Dr. Arthur King to task for the latter's statement " the socialization of the practice of medicine by the national health insurance scheme has tended toward its mechanization at the expense of its personal and profound nature " (June 13th, p. 1231). Dr. Mackenzie asks with severity: " What does he mean? How long did he take to evolve words so full of nothing?"

My interpretation of the statement is that panel practice in action tends to produce the following:

Patient (entering consulting room, and taking seat on chair): " I want somethin' for this wheezin' on my chest, Doctor. I've had it for a week now. Cough at night somethin' awful."

Doctor: " Very well, take off your things and I'll examine your chest."

Patient: " Oh, never mind that, Doctor! Just give me a bottle of cough mixture—some of that black stuff—and I'll

be all right. I just called in as I was passin' up the street and thought I'd better get somethin' before it gets worse."

Doctor (glimpsing in the waiting room a crowd of other patients who just called in as they were "passin' up the street"): "Very well. Here you are." (Hands him prescription for mist. tussis, fishes out his panel card, enters date, diagnosis, treatment, etc., "shoos" him out to make way for another who wants something for his rheumatiz in the shoulder—and so the process is repeated.)

Well, isn't that mechanization? Is that all an M.B., B.S., or M.R.C.P. has to do? Has he any chance, or is he allowed to do much, in the ordinary conditions of panel practice? What is the general practitioner in England to-day but a glorified first-aid man? Quack patients beget quack doctors. It is a question, from the general practitioner's point of view, of getting as many patients as he can on his list and getting the consultations over as fast as he can. Only by such means can a living be made. If the doctor comes across an illness which may interest him, had he the time and were he reasonably paid to treat it, he simply refers the patient to the nearest hospital: insurance committees do not encourage academic excursions by general practitioners.

Whatever lack of meaning Dr. King's statement may have to Dr. Mackenzie, to me it is fraught not only with meaning but with portent: moreover, if these people who are patients had only to pay 3d. to see the doctor it would cut down England's drug bill by half. The medical curriculum, as at present existing, is not adapted to the conditions of practice. Panel practitioners do not need to be M.B., B.S., etc. Any intelligent nurse could run a panel practice successfully. And so, as the country has allowed its medical profession to be partly nationalized, why not go the whole hog? It would be a great deal more satisfactory in the end than the present chaotic and makeshift arrangements. Under such a nationalized scheme medical men would be so educated that they would advance by grades.

The country would be divided into medical districts on a population or a population-cum-geographical basis (as some districts, whether possessing the requisite population or not, are naturally separable by geographical or topographical factors). Some districts would be divided into subdistricts. This done, the first qualifying examination which a medical student achieved would not entitle him to practise except as assistant to one of the men in the higher grades, who would be ready to deal with the cases referred to him. He would not be allowed to conduct without such supervision even a panel practice. If he wished to pass from this grade—call it C grade to B grade—he must do so by examination, and would be given two years' study leave. As B-class men would be eligible to be placed in charge of subdistricts and smaller hospitals, it would be necessary for them to be subjected to a searching examination in anatomy, physiology, obstetrics and gynaecology, surgery, etc., and elevation from B2 to B1 would follow as a result of favourable inspectorial examination of the administration of his district, after a two-year interval. To get into A grade would require a further examination, general, plus whatever specialty or specialties the A-grade man wished to take up—and all at a high standard. A-class men only would be in charge of districts or hospitals (Class I), and the A-grade man would have, of course, other A-grade, B-grade, and C-grade subordinates. As the C-grade examination would be awarded after four years' study and would be relatively easy to obtain, it would be unnecessary for one man to have more than 500 to 750 patients to attend to. A great many C-grade men would be content to remain so, and collect their £300 per annum, while those who had some of the personal and profound interest in their profession hinted at by Dr. King would have full opportunity and financial encouragement to give effect to their predilections, since an advance in grade, or subgrade, would carry with it substantial advance in pay. And whereas advance in grade would be by academic—that is, professional—examination, advance in subgrades would follow favourable reports on conduct and administration at two-year intervals by inspectors appointed for the purpose. The academic ideals of a medical curriculum must conform to the practical needs of the situation brought about by the application of the very practical National Health Insurance Act.

Such a scheme as I have envisaged, all too sketchily, combined with the making of the patient responsible for a fee, however small, for every visit to the doctor, would effect a great transformation in economy and efficiency in the medical services to the people.—I am, etc.,

Mt. Magnet, Australia, Aug. 4th. F. S. TAYLOR-THOMAS.

The London Clinic

SIR,—In view of the recent reports in the Press of the winding-up of the company known as the London Clinic and Nursing Home Ltd., I would like to make it perfectly clear:

1. That the London Clinic was purchased in January last by the present company.
2. That the present company has no connexion with the old company now in liquidation.
3. That the present company is one limited by guarantee, and under its constitution is precluded from distributing among its members any part of its profits, the whole of which must be applied to the promotion of its objects.

At present large sums of money are being spent on improvements in order to give to the medical profession and their nursing home patients the best possible service. I hope it will be clear to your readers, therefore, that there is no question but that the services of the London Clinic will continue to be available to them.—I am, etc.,

For and on behalf of Trustees of the London Clinic Ltd.,
N. W. LEWIS,
Secretary.

London, W.1, Sept. 1st.

The Services

HONORARY SURGEON TO THE KING

Surgeon Commander H. E. Y. White, C.V.O., O.B.E., has been appointed Honorary Surgeon to the King.

DEATHS IN THE SERVICES

Colonel Gofton Gee Adams, C.B.E., late R.A.M.C., died at Clifton on June 28th, aged 75. He was born on September 13th, 1861, at Nailsea, Somerset, was educated at Bristol and at St. George's, and took the M.R.C.S., L.R.C.P.Lond. in 1885. Entering the Army as surgeon on May 30th, 1885, he became colonel on March 1st, 1915, and retired on September 13th, 1918. He served in the war of 1914–18, and was mentioned in dispatches. He received the C.B.E. in 1919.

Colonel Frederick Kiddle, C.M.G., late R.A.M.C., died on July 11th, aged 64. He was born at Southsea on September 11th, 1871, and was educated at Trinity College, Dublin, where he graduated B.A., M.B., B.Ch., and B.A.O. in 1892. After acting as assistant medical officer at the Essex and Colchester Mental Hospital at Severalls, he entered the Army as surgeon lieutenant on January 29th, 1895, became colonel on December 26th, 1917, and retired on August 23rd, 1920. From January 1st, 1910, to March 1st, 1912, he was seconded as deputy surgeon of the Royal Hospital, Chelsea. He served in the war of 1914–18, was mentioned in dispatches in the *London Gazette* of February 17th, 1915, and January 1st, 1916, and received the C.M.G. in 1917.

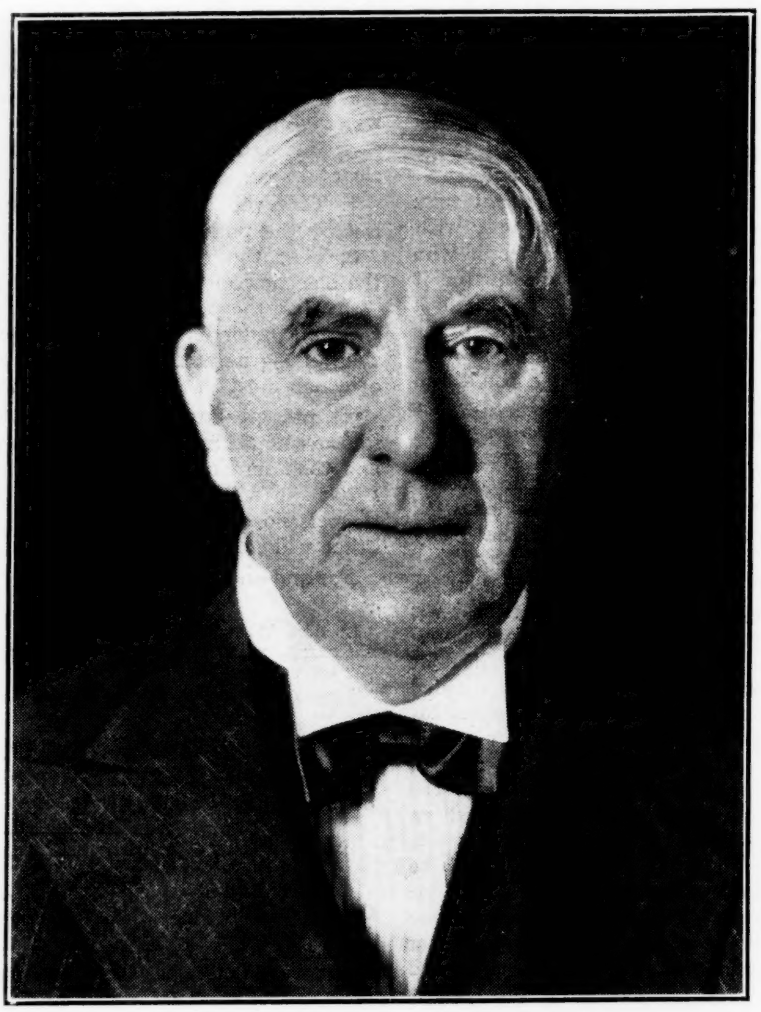
Lieut.-Colonel Arthur Henry Leapingwell, Madras Medical Service (ret.), died in Guernsey on August 20th, aged 88. He was born on November 12th, 1847, the son of Dr. William Leapingwell of Oxford, and took the L.R.C.S.Ed. in 1869 and the L.R.C.P.Ed. in 1873. Entering the I.M.S. as assistant surgeon on April 1st, 1873, he reached the rank of brigade surgeon lieutenant-colonel on March 1st, 1898, and retired on March 31st, 1901.

Obituary

LORD MOYNIHAN

Consulting Surgeon, General Infirmary at Leeds; Emeritus Professor of Surgery, University of Leeds

Lord Moynihan died at his home, Carr Manor, Meanwood, Leeds, on September 7th. He had attended a few days before the funeral of Lady Moynihan, whose death had come as a great shock to him. On September 6th the following statement was issued: "Lord Moynihan had a seizure on Saturday morning and has since been unconscious. His condition is worse to-day and gives cause for increasing anxiety." He was in his seventy-first year.



Berkeley George Andrew Moynihan was born in Malta on October 2nd, 1865. His father was Captain Moynihan, V.C., of the 8th Foot (The King's Regiment). He went to the Royal Naval School and received his medical education at Leeds and Berlin. Moynihan qualified in 1887 with the M.B., B.S. degree, London, and the diplomas of the Royal Colleges. He took the F.R.C.S. in 1890, and in the examination for the M.S.Lond. in 1893 was awarded a gold medal. After residence in the General Infirmary at Leeds as house-surgeon and resident surgical officer he was appointed to its honorary surgical staff in 1896, and was also demonstrator in the anatomy department of the Yorkshire College Medical School. Later he became professor of surgery in the University of Leeds.

He lived his life to the full, and enjoyed the fame which he so thoroughly deserved. Honours were showered upon him from all parts of the world: his own city of Leeds conferred upon him the honorary freedom of the city; he was made Vice-Chancellor of the University of Leeds on the occasion of its jubilee in 1924; and he was elected a vice-president of the British Medical Association in its centenary year, 1932. He received the honour of knighthood in 1912. In 1917 he was made a C.B., a K.C.M.G. in 1918, and a baronet in 1922. In March, 1929, he was created Baron Moynihan of Leeds.

He was president of the Association of Surgeons of Great Britain and Ireland, 1922–3, and president of the Section of Surgery at the annual meetings of the British Medical Association in 1925, 1930, and 1932.

Moynihan began working in association with the late W. Mayo-Robson, who was then advancing a technique of aseptic abdominal surgery and making a great reputation for the Leeds school of surgery, which Moynihan subsequently fostered and amplified by his own striking work. They jointly wrote a book on *Diseases of the Stomach* in 1901, at which time very little was known about duodenal ulcer, in the elucidation of the symptomatology of which Moynihan played a great part. In the latter end of the same year (*Lancet*, 1901, ii, 1656), in a paper on duodenal ulcer and its surgical treatment, he wrote that the disease was coming more closely under the observation of surgeons. It was characterized by latency and torpidity, but he was disposed to think that reliance might, in general, be placed on the time of the onset of the pain after food as indicating the position of the ulcer in the stomach or duodenum; and, as a rule, the nearer the ulcer to the cardia the more swift was the onset of the pain. An early use of the term "hunger pain" by Moynihan appeared in the *Transactions* of the Clinical Society, 1904, in a communication on "Simple Ulcer of the Stomach and Duodenum." "A 'hunger pain,' a pain eased by the taking of food and appearing two to four hours after the meal, was noticed in cases both of gastric and of duodenal ulcer, and was always associated with hyperchlorhydria." Before duodenal ulcer was widely recognized as a clinical and pathological entity most of the cases of painful indigestion were ascribed to the presence of a gastric ulcer, especially when the pain came on after food. It used to be said in those days, with what degree of truth is not known, that Sir William Whitla at Belfast had a practical way of diagnosing gastric ulcer. If his house-physician reported that such a case was possibly one of gastric ulcer Whitla used to tell him to give the patient some bread and cheese. "If it brings on the pain it is a gastric ulcer: if it eases it, it is not one." Moynihan's gift as a speaker was called upon on many occasions, one of the last addresses he delivered being the Linacre Lecture at Cambridge, when he followed an interesting by-path of medical history. One of the most striking of his addresses was that on the "Pathology of the Living," given to the Ashton-under-Lyne Division of the British Medical Association in 1907. Mr. Moynihan (as he then was) told how when he was first resident in the Leeds

Infirmary approximately two-thirds of all the patients died after abdominal section.

This, he said, was due in part to the large proportion of "too-late" cases in the total number of operations. It was not uncommon then for the surgeon who recorded the presence of certain pathological states seen during an operation to be held up to good-humoured derision by other surgeons and residents when the post-mortem examination showed a state of affairs supposed to be entirely at variance with these. It did not occur then to observers that the post-mortem evidence was of far less value and significance than that which had been furnished during the life of the patient. The knowledge gained during an operation showed that much of post-mortem pathology was of small value compared with the pathology of the living. It was of greater import and use to see the actual condition in life of an organ which was abnormal than to see this months or years afterwards, when unalterable and extensive advances, and perhaps a terminal infection, had been added to the simpler, original cause of the disturbances of health. It was of much more importance to know the pathological conditions which caused present sufferings—a change which was perhaps remediable—than it was to know the fullest particulars of an unhindered morbid change that at last caused death.

Many other addresses or papers had for their basis the same striking thesis—"The Pathology of the Living"—in fact, he returned to it time and again, no matter on what subject he might be speaking. *The Pathology of the Living and Other Essays* (1910) contained reprints of nine important addresses on diseases of the abdominal organs revealed by the method of investigation designated in the address which gives this book its short title. The book met with definite success, and is one of the scarcer volumes on library shelves. Among his other publications were: *Abdominal Operations*, which reached a fourth edition in 1925; *Gall-stones and their Surgical Treatment*; and *Duodenal Ulcer*.

In 1920 he was invited to give the first Murphy Memorial Oration before the American College of Surgeons at Montreal. It was a very fine tribute of respect to John Benjamin Murphy. No one could outshine Moynihan in an address for such an occasion, and in his own attractive style he gave a brilliant survey of the progress of surgery from Hippocrates to Murphy's day. One impressive remark in the account of Hippocrates may be recalled as perhaps to some extent a characteristic of the lecturer himself: "If the power of wide and accurate generalization be, as I believe it to be, amongst the supremest accomplishments of the human mind, then Hippocrates may in truth be said to have had few rivals—if, indeed, he has had any—among all those who in later times and in all countries have devoted themselves to the science of medicine."

Whilst in Montreal he made, with Sir William Taylor of Dublin and Mr. Albert Carless, the formal presentation of a ceremonial mace to a meeting of the American College of Surgeons, with the following dedicatory inscription: "From the Consulting Surgeons of the British Armies to the American College of Surgeons, in memory of mutual work and good fellowship in the Great War, 1914-1918." Moynihan's own services during the war were of supreme value. In 1914 he was appointed consulting surgeon to the Northern Command, and afterwards served for two years as consulting surgeon to the British Expeditionary Force, with the rank of Major-General A.M.S. He acted as chairman of the Council of Consultants from 1916 to 1919. His association with the College of Surgeons was a long and active one. He delivered the Arris and Gale Lectures, 1898–1900; and was Hunterian Professor, 1919-20, and Bradshaw Lecturer in 1920. He served on its Council, and held the office of President for the record period of six years.

Moynihan's complete confidence in himself and his vigorous personality made him a formidable controversialist who never feared to speak his mind—and he spoke it in a suave and mellifluous English which has rarely been equalled by medical orators. He prided himself on being a physician who had to employ surgery as a method of treating his patients, and as a "physician-surgeon" was alive to the importance of physiology, and alarmed lest physiology should abstract itself from the study of the human being. "Physiologists and surgeons," he said in his Hunterian Oration before the College of Surgeons in 1927, "are, far more often than is realized, necessary to each other, and a closer communion should exist between them. Many of the truths the physiologist endeavours to teach can be demonstrated more clearly in the wards than in the laboratory, and are therefore, because of this human interest, impressed almost indelibly upon the minds of students." He returned to this theme in his address to the Guy's Hospital Medical School in 1930, when he deplored what he thought to be the remoteness of physiology from human affairs, and saw danger in its alliance with chemistry and physics. In the same address he criticized the Medical Research Council as being "too busy with little things, too aloof from the day-to-day practice of medicine, out of touch with the needs and desires of clinicians. . . . What have laboratory workers done to help us in the recognition of such a disease as gastric or duodenal ulcer, infections of the gall-bladder and cholelithiasis, splenic anaemia, haemolytic jaundice, to mention some of the diseases with which I am very familiar?" This attitude to laboratory research and physiology had all the virtues and limitations of a man who brought to every operation he performed the mind of a research worker, a worker who, by the nature of his craft, must needs investigate by observation rather than by experiment. The detachment of the pure scientist was something he perhaps did not fully appreciate. His attitude was that of a pragmatist. Yet his forceful and direct mind has exerted a great and beneficent influence upon the recognition of clinical research, in the operating theatre and the ward, as a method of scientific investigation comparable in value to those other biological sciences upon which medicine is dependent.

One of the last functions Moynihan attended at the Royal College of Surgeons was in July of this year, when he was presented by the subscribers to the *British Journal of Surgery* with a silver statuette of a young man standing on a crystal globe and holding above his head an open book of gold bearing the words "The British Journal of Surgery, 1913–1935." A cheque for 1,000 guineas was also handed to him, which he presented to the College to be expended on research work in surgery. The July number of the *British Journal of Surgery*, which was dedicated to Moynihan, gives an account of how two of his favourite projects—the formation of the Association of Surgeons and the *British Journal of Surgery*—began to take shape. Moynihan had already founded the Moynihan Chirurgical Club. The members of this club used to spend a week together in hospitals abroad, and met for a second time in the year to visit a hospital in which one of them worked. The war led to the postponement of the first project, and the Association of Surgeons was not founded until 1919, when Sir John Bland-Sutton was its first president. The *British Journal of Surgery* first appeared in April, 1913, with Moynihan as the chairman of the Editorial Committee.

"The Journal has been born, it has survived the dangers of infancy and adolescence, and grown to adult age during the more than twenty-one years that Moynihan has presided over its destinies. During that time he

never missed a meeting of the Editorial Committee, and these meetings have always been as happy under his chairmanship as they have been fruitful of good results."

As a master craftsman, as an indefatigable advocate of whatever cause aroused his enthusiasm—we recall his work for the Cancer Research Fund—as a promoter of clinical research, Moynihan has been a great servant of the profession to which he belonged.

He married in 1895 Isabella Wellesley, daughter of Mr. Thomas Jessop, F.R.C.S., who was a surgeon to the Leeds Infirmary. Lady Moynihan died on August 31st. They are survived by one son and two daughters.

At the funeral service at Leeds Parish Church on Thursday the British Medical Association was represented by Professor William MacAdam, and at the memorial service in London by Sir Henry Brackenbury.

Sir CUTHBERT WALLACE, President of the Royal College of Surgeons, writes:

The death of Lord Moynihan leaves a great void, for he was an outstanding figure in British surgery. The position he held in the surgical world he made for himself, for he had no influence at the start. He raised himself to the place of a great surgeon held in repute all the world over. Gifted with mental powers of a high order, he added thereto industry, determination, and imagination. He was skilful, progressive, had the capacity for taking pains; he insisted on the necessity of attention to small points and stressed the necessity of gentle treatment of the human tissues. Many people endowed with great gifts are content to go through life using the capabilities with which nature has endowed them, but Moynihan strove all the way to cultivate and improve his talents. He had the pen of a ready writer, and expressed himself clearly and concisely. Perhaps his greatest gift was that of speech. In this he was pre-eminent among surgeons and indeed among many public speakers. As was the case with his other attainments, this gift was carefully cultivated. It was a pleasure to hear him speak, and the hearing left one filled with admiration at the effort. His Hunterian Oration must be still fresh in the minds of many. It was delivered without a note and without hesitation, and flowed on smoothly and consecutively from the beginning to the last word.

While most men shrink from public speaking, to Moynihan it was a pleasure and a stimulus. It is no wonder that one so endowed should become a prominent figure not only in the world of surgery but among men of other affairs, but he possessed another attribute which much increased his influence. Moynihan inspired reverence and admiration in those with whom he associated, and thus it came about that he founded the surgical club that bears his name and which has had considerable influence in the past. After serving the usual offices he became president—the first provincial surgeon to fill the post and the only president to reign for six years. These two facts made the period of office remarkable, but it is remarkable for other reasons. It was during this time that he was elevated to the peerage. This honour was, I think, more appreciated by him than it has been by other recipients, for it meant that the profession was honoured in himself. Though this honour befell during his presidency it will not be remembered at the College as the most important happening of his reign. This lay in another direction. Moynihan with others looked back with regret to the closing of the College Research Laboratories. It was his intention that this should be remedied as soon as possible, and it was during his time that the Research Laboratories were again opened, under the direction of Sir Arthur Keith. Moynihan, through his good offices, brought money to help forward this movement and to endow scholarships. It was fitting then that he should receive as head of the College that magnificent gift of Sir Buckston Browne.

The part he played in the foundation of the Association of Surgeons of Great Britain and Ireland and in the establishment of the *British Journal of Surgery* is known to all. It was in connexion with the latter that a tribute was paid to him within the walls of his College only two months ago. The occasion was the presentation to Moynihan of a statuette symbolic of the everlasting youth of surgery. It was given in remembrance of the part he had played in the foundation of the *Journal* and of the ever-watchful care that he had lavished on it. With the statuette was a gift of a thousand guineas that he handed to the College with the intention that it should be devoted to the furtherance of research within the College to which end he had expended so much time and trouble. The occasion was a remarkable tribute to a great man, and from words spoken afterwards it is a consolation to know that this exhibition of the esteem in which he was held was a source of great satisfaction to the man.

Sir D'ARCY POWER writes:

Lord Moynihan, whose death we deplore as a great loss to surgery, was a fine surgeon, a good administrator. He was full of ideas, many of which his tact and ability enabled him to put into practice. He was fortunate in his place and period: Leeds had a long history of good surgery, not dominated by London or Edinburgh. Moynihan increased its reputation, and whereas the work at the General Infirmary had been carried out by general practitioners with a leaning towards surgery he specialized in operations and early adopted in all their rigour the principles advocated by Lister. Of a receptive mind he was contemporary with the beginning of abdominal surgery, and under his guidance Leeds soon became a centre for those who wished to watch operations for removal of the appendix, exploration of the gall-bladder, removal of the stomach, and short-circuiting of the intestine. As a man of ideas he soon learnt that experimental surgery was almost dead in Great Britain and he set himself to resuscitate it. Possessed of great persuasive powers and gifted with much tact he soon enlisted such generous donors as Sir Buckston Browne to establish an experimental surgical farm at Downe, where the Hunterian tradition is being revived and advanced under the guidance of Sir Arthur Keith.

Finding that English surgeons knew but little of each other—for they worked in watertight compartments—and even less of what their colleagues were doing abroad, he was instrumental in forming a visiting club which cemented friendships and tended to make surgery international. Twenty years ago there was no journal devoted entirely to surgery. Moynihan took the lead in founding the *British Journal of Surgery*, nominated competent officials, and himself remained as chairman of the Editorial Committee. During the European war he did good administrative work as Chairman of the Army Advisory Board and President of the Council of Consultants. More recently he became interested in cancer research, and was an advocate for euthanasia. An eloquent speaker with a pleasant voice and a sense of humour he delivered admirable addresses and lectures, many of which were impromptu, though the more serious, like the Hunterian Oration and the Romanes and the Linacre Lectures, were carefully prepared.

As a man he was dominant, but carried most of his plans to a successful conclusion with tact and without acrimony. Not grasping for money, he knew the value of his services, for he began life as a poor man. He was happily married, and there can be but little doubt that the sudden death of Lady Moynihan was a shock which put a period to the life of one who used to boast that he never had felt fatigue.

Professor RUTHERFORD MORISON writes:

Lord Moynihan was unique. He was a great surgeon, a great orator, a great writer, a great operator, and a great leader. No one can take his place.

It is fifty years since I first met him. I was in practice then in Hartlepool and had operated upon a patient in whom he was interested. He wrote asking if I could see him and tell him all about the case if he came through. After our discussion he visited the hospital with me, and I was impressed then, as I was at every later meeting with him, by his alert interest in every detail and his marvellous powers of observation. The next time I saw him was at Leeds Infirmary. Moynihan was then resident surgical officer, and his chief interest was in fractures. He showed me a case in which a boy had fractured the lower end of his humerus into the elbow-joint and ankylosis had occurred in full extension. We agreed that this must be remedied, and I suggested making a transverse incision above the olecranon, division of the triceps, and excision of the lower end of the humerus—and he undertook to consider this. From this time I noticed with interest his steady and inevitable rise to the highest attainable positions, gained by the sheer force of such irresistible ability as could not be ignored. During one of my visits to him he took me to a private hospital, only telling me that he had a most interesting case there. On entering a room he introduced me to Lady Moynihan, saying that he had removed her appendix three days before. She was well enough for me to tell her that I felt sure this was the most difficult operation he had ever undertaken, and she agreed. In the following years I frequently met him. The last time I visited Leeds I saw him perform two operations. Both of these operations thrilled me, because they showed such perfect art. Surgery will be for ever indebted to Lord Moynihan for his insistence upon perfection of technique. Operating under his hands appeared so easy that any hitch was incredible.

Though Lord Moynihan's skilful and beautiful operations will not soon be forgotten, my feeling is that the future will attach even greater importance to his founding of the Moynihan Chirurgical Club. It is difficult to overestimate the value of this experience, not only to the surgeons and their patients but to the whole community.

Professor ERNEST W. HEY GROVES writes:

Lord Moynihan's death has come with such tragic suddenness that we find it difficult to believe that we shall hear his voice no more. To those of us who were intimate with him the voice will always remain as the dearest memory.

It was in 1913 that my close association with him began, when he consented to become the chairman of the newly projected *British Journal of Surgery*. From then until that memorable evening in July, 1936, when the presentation was made to him on behalf of the *British Journal of Surgery* at the Royal College of Surgeons, we had been in the closest contact in relation to the affairs of the Surgical Club, the Association of Surgeons, the *Journal of Surgery*, and the Council of the College. The foundation of his fame and greatness lay in his operative technique. Great dexterity and gentleness were combined with an infinite capacity for taking pains. Although he loved having a big crowd watching him operate, he never allowed himself to become a showman or to sacrifice his gentle care of the tissues under his hand to the desire for a spectacular demonstration. Probably the most dominating emotion in his life was the love of beauty. In the best sense of the word he was an artist. He loved flowers, pictures, and poetry, and all beautiful things, but it was in perfecting his own handiwork on living tissues that he gave best expression to his worship of aesthetic perfection. I never heard him discuss religious matters, but in the true sense of the word he was a religious devotee, dominated all his life by the pursuit of his great ideals.

Having perfected his own technique and formed his own ideals he must needs teach these things first to his own pupils and colleagues and then to the surgical world at large. In close friendship with Sir Robert Jones, Sir Harold Stiles, and Professor Rutherford Morison, he formed the Surgical Club, and later he took the leading part in founding the Association of Surgeons. Through these agencies and that of the Royal College of Surgeons he did his great work of bringing together all the surgeons of this country and setting up a high standard of surgical work. For twenty-three years he directed the editorial work of the *British Journal of Surgery*, and in this way, too, by his wise judgement, inspiring thought, and most of all by his force in bringing men together, he raised the standard of British surgery to its present high level.

His natural eloquence was a ready instrument for explaining his ideals and furthering his objects. Whether he spoke on the spur of the moment or on formal occasions words and phrases seemed to group themselves in musical sequence. Two occasions stand out in my memory of him as an orator and a host. One was when he delivered the Hunterian Oration in the presence of Princess Mary, and his packed audience were entranced by words which, read in cold print afterwards, seemed commonplace. The other was when he entertained his colleagues of the Council and their wives at dinner on the terrace of the Houses of Parliament. For he made an ideal host, with his fund of stories and his wonderful memory for the idiosyncrasies of his friends.

Leeds, London, and the world of surgery will long mourn the loss of Moynihan, a great surgeon, a great orator, and a great leader.

Professor T. WARDROP GRIFFITH writes:

The relationship between the late Lord Moynihan and the Leeds School of Medicine has been such that the school has always been proud of its most distinguished student, who, on the other hand, has never tired of saying that any success he may have attained in his professional life has been due to his association with the school rather than to anything else.

I am the only member of the honorary staff of the Infirmary now resident in Leeds who can remember Berkeley Moynihan entering on the second or clinical part of his studies at the General Infirmary at Leeds in the year 1886, where at that time I was resident medical officer. I can recall with great clearness the first case on which I got him to make notes. The case was one of birth palsy, and his notes were full and excellent in all respects. We have often spoken of the lad, the last time as recently as a fortnight ago. After leaving the Infirmary and until the time of his death the boy used to sit in a sort of home-made perambulator opposite the Grand Theatre in New Briggate, ostensibly trying to sell some kind of literature and, incidentally, as Moynihan remarked to me, a source of perennial expense to him! I saw a great deal of his work as a student, and I am able to testify to the very high opinion his teachers formed of his abilities at that early stage of his career. I can remember great praise coming from Mr. Jessop, Mr. Mayo-Robson, and, most emphatically of all, from Mr. McGill, a man for whom Moynihan always had the greatest admiration. It is pleasant to remember that not many years ago Moynihan bore testimony to the pioneer work in prostatic surgery which had been done by his well-loved master, who died in the year 1890. In the early 'nineties, when I held the chair of anatomy, he acted as one of my honorary demonstrators.

I have thought it fitting thus to dwell on the earlier part of Moynihan's connexion with our School of Medi-

cine. Others share with me a knowledge of his subsequent career, and many can, of course, speak with greater authority of his surgical ability, of his great contributions to the science as well as to the art of surgery, and of his teaching capacity. To their abler hands I leave this. I venture, however, to say—and I have given expression to this before—that true success in a surgeon calls not only for great manipulative skill and for sound judgement, but also for that other something which we call personality. This was possessed by Moynihan to a truly remarkable degree. No one, certainly no suffering patient nor any anxious friend, could come in relationship with him without being comforted by his kindly consideration and sympathy, by his understanding mind, and by his glorious and infective optimism. This also I desire to say: a good many members of the honorary staff of the Infirmary, myself among the number, are under a deep debt of gratitude to him for services rendered either to themselves or, what they value more highly, to those who are near and dear to them. That is a debt which we know can never be repaid. In that respect we must remain hopelessly bankrupt, but with our hearts full of gratitude to our dear friend and colleague.

Sir WILLIAM WHEELER writes:

The death of Lord Moynihan leaves a void in the ranks of surgery which cannot be filled. He has been recognized by the world as a superman, and this recognition has stimulated many generous tributes in the Press. I venture to add my humble homage to his memory. Although Moynihan was born in Malta he always referred to himself as an Irishman. He took an unstinted interest in the Irish School of Medicine, and it in turn was proud of his great achievements. Admiration for his work and personality was stimulated by his many visits to Ireland. It found expression in the conferment of honorary degrees and diplomas by the University of Dublin, the Royal College of Surgeons and the Royal Academy of Medicine. His name was mentioned as a possible successor to the retiring Governor-General of the Irish Free State during the Cosgrave regime.

By common consent Lord Moynihan's writings and his manner of speech were beyond criticism; we will not hear him again, but his writings for many years will act as a torch to illumine the path of surgical progress. He regarded writing and the record of surgical experience as a solemn duty. He shared with Osler "that feeling which impels a teacher to be a contributor and to add to the stores from which he so freely draws." Some years ago, when visiting Leeds with the late J. B. Murphy of Chicago, I saw Lord Moynihan perform an abdominal operation with characteristic beauty. Murphy whispered to me that he would have travelled all the way from America with the one object of witnessing such perfection. Lord Moynihan was endowed with rare gifts; he developed them in the fields of surgery and literature in a manner which should be an example to all.

[The photograph reproduced is by Elliott and Fry, Ltd.]

G. R. FORTUNE, L.R.C.P., L.R.C.S.ED., L.R.F.P.S.Glas.

We announce with regret the death, at the age of 68, of Dr. George Roy Fortune. For the following we are indebted to Dr. JAMES HUDSON.

The sudden death of George Roy Fortune of Newcastle-upon-Tyne took place in the Isle of Man, where he always spent his holiday, on August 28th. He was born in Glasgow, where his father, Baillie Fortune, filled a very prominent place as a Liberal politician and was the originator of the famous phrase "We are seven," when Glasgow returned seven Liberals at one election. He took the triple qualification in 1892, having studied at the St. Mungo's School of Medicine, attached to the Royal Infirmary, Glasgow; for six months he was house-surgeon to Sir William Macewen, and had many experiences to relate concerning him. Dr. Fortune settled in Glasgow, and was police surgeon to the Central Division for some years till he came to Newcastle. He was never one to hide his beliefs, and was prominent during the insurance fight as being in favour of it, though he supported the profession in their demands. He was always active in any medico-political movement, and was chairman of the Local Panel Committee from 1925 to 1927. He was one of the vice-presidents of the North of England Branch of the British Medical Association this year, and was beginning his year of office as chairman of the Division, an honour of which he was very proud. When one thinks of Fortune one immediately associates him with the Burns Club, which was very near his heart and of which he was president for three years. He had some valuable editions of Burns's works. He had many interests in life, and though never robust fulfilled a very useful place in the medical life of this city.

"T. C." writes: With the passing of Roy Fortune one feels that another landmark has gone and there is a vacant place in the civic life of Newcastle which can never be filled. Fortune was not a "brilliant" man nor a "clever" man, but he was a "character": all brother Scots will appreciate that word. He carried on a large and lucrative practice in Newcastle for thirty years, and will be sadly missed and sincerely mourned by three generations of patients. Roy Fortune was the type of Victorian Scottish doctor to which the world owes a great deal. In the years that I knew him he never changed. He always dressed in clothes of sombre hue and a "pot" hat, with a heavy gold albert across his ample front and a couple of valuable rings on his fingers, the living example of the late Victorian general practitioner. One never thought of Fortune as an old man; he kept himself young by his intense interest in life. If I had to describe him in two words I would say that he was inquisitive and acquisitive. He liked to know about every phase of life—medical, political, and social—he never spared himself in his efforts to keep abreast of the times. A stalwart supporter of Liberalism as it was in the days of Morley and Asquith, a consistent Presbyterian, yet a fervent admirer of Robbie Burns, I think his greatest pride was the fact that he was three times president of the Newcastle Burns Club. Fortune was one of those busy men who can always find time to take on another job. The type is becoming rare in these days. All of us who try to carry on medico-political work in the North will miss his presence at our meetings. He has gone to his reward, and the world will be the poorer for his absence.

G. W. N. JOSEPH, M.D., D.P.H.
Medical Officer of Health for Warrington

Dr. G. W. N. Joseph, the well-known medical officer of health for Warrington, died on August 28th, aged 58. As a student Dr. Joseph had a brilliant career at Liverpool University, winning ten medals in various subjects. In addition he was elected senior Lyon Jones scholar, and was awarded the Gee prize for his work on diseases of children. In 1907 he graduated M.B., Ch.B., and later proceeded to the M.D. and the D.P.H. He held many resident appointments at the Royal Infirmary, Liverpool, and afterwards became medical officer to the Mill Road Infirmary, where, in association with Dr. Nathan Raw, he received a wide experience in cases of tuberculosis. In 1912 he was appointed assistant medical officer of health for Warrington in succession to the late Dr. C. W. Hutt, and in the following year succeeded to

the senior office when Dr. Hibbert moved to Blackburn. For twenty-three years he devoted his energies and exceptional abilities to the public health services of the borough.

Dr. Joseph was rejected for war service on account of a heart lesion, but in spite of his disability he never allowed his energies to flag. He developed and organized the school medical services—inspection and treatment of minor ailments. The tuberculosis service received very special attention, and it was a daring move to provide a new sanatorium at Weaverham, Cheshire, for a relatively small borough. This sanatorium was extended to eighty beds, and now receives patients from other districts. A venereal disease clinic was organized, and last, but not least, a municipal maternity home was established in an old mansion situated in one of the public parks. Soon after the passing of the 1929 Act he persuaded his council to take over the Poor Law Infirmary attached to the Whitecross Institution. This is now known as the Borough General Hospital, and the change of attitude of both the public and the local profession to this hospital is a welcome sign of its efficiency and popularity. His last effort in progressive medical organization was to establish a public assistance medical service with free choice of doctor. This he did in conjunction with the local Division of the British Medical Association, and although only in operation for a short time it is working well.

This bald record of Dr. Joseph's local activities is but one side of his professional life. He was a loyal member of the British Medical Association, and took part in the proceedings of the Lancashire and Cheshire Branch Council. From 1919 to 1921 he was a member of the Maternity and Child Welfare Committee, and for the past year had been a member of the Public Health Committee. He was also a fellow and member of council of the Society of Medical Officers of Health, and a fellow of the Institute of Public Health and of the Royal Sanitary Institute.

A colleague writes: Joseph did not write much; his annual reports, well arranged and composed, afforded a sufficient outlet for this trend. He was essentially a man of action, and he was no mere office doctor. I remember an incident in which a midwife one morning made many efforts to get a doctor to a difficult case. No one was available at the time, and in despair she applied to the Health Office. Joseph left his desk at once, found a transverse presentation patient, and delivered her successfully. His last illness proved him a man of courage and courtesy. On the day before his death he shook hands with his medical attendants and thanked them for all they had done for him. Courage, courtesy, kindliness, these were the attributes of the man which made him so well liked by his professional brethren and the public.

THOMAS WILLIAM McDOWALL

Professor A. GREY TURNER writes: I should like to add to your obituary notice of the late Dr. Thomas McDowall one or two particulars which may be of interest to some of his old friends.

From the time he took up his duties as superintendent at the County Asylum in Morpeth, Northumberland, about sixty years ago, he was connected with the Medical School in Newcastle-on-Tyne. He was a lecturer and then professor in his own subject, and regularly conducted classes at the asylum. These were held in the summer, and made a very pleasant excursion, for Morpeth is in the country sixteen miles from Newcastle. McDowall was very amusing in his methods but at the same time thoroughly practical, and he certainly knew how to handle the insane. Both he and his wife were most hospitable, and always entertained the class, no matter how large, to afternoon tea afterwards. In 1900 he started an out-patient department in the old Infirmary at Newcastle in the hope that it might be possible to deal with some cases of early mental derangement much on the plan which has since been elaborated by the Maudsley Hospital. But this department, for some reason or other, was not a great success, and after two or three years was discontinued. McDowall used to complain that he only got the dregs from the other departments, so that he soon came to have a most wonderful collection of neurotics of one sort or another. For many years he acted as examiner in his subject in the University of Durham, and in that capacity he was certainly indulgent. As superintendent of the County Institution he took the greatest interest in his medical officers, and encouraged them to make post-mortem examinations and to do some work in pathology. He was always ready to do anything he could to relieve the physical disabilities of those under his care, and he had no hesitation in having operations carried out if they were likely to add to the comfort of the patients quite irrespective of their mental condition. But no record, however brief, of his professional work would be really complete without mentioning the place he occupied in connexion with the little country town in which the asylum was situated. He was an enthusiastic musician and for practically the whole of his life a chorister, and took a great interest in the choir at the church in the grounds of the asylum. During the winter months he also arranged weekly or fortnightly concerts, and had a regular orchestra in which the patients sometimes took part. As the result of his enthusiasm a "Choral Union" was founded, and for years was very popular and active. He was of a warm-hearted nature, although his rather abrupt and brusque manner was a little startling to those who did not know him. Both his surviving sons entered the medical profession, and Dr. Colin McDowall is the medical superintendent at Ticehurst.

We regret to announce that Dr. JAMES JENKINS ROBB of King's Norton, Birmingham, died in the Orkney Islands on August 10th, at the age of 70. He had been a member of the Central Birmingham Division of the British Medical Association since 1903. He received his medical education at the University of Glasgow and at Birmingham, graduating M.B., C.M.Glasg. in 1892; he proceeded M.D. in 1895 and obtained the D.P.H. of Birmingham University in 1917. He was an examiner for the St. John Ambulance Association and Divisional Surgeon to the St. John Ambulance Brigade. During the war Dr. Robb served with a temporary commission as captain in the R.A.M.C., and after demobilization he was appointed deputy commissioner for medical services under the Ministry of Pensions, receiving the O.B.E. in 1920. Some twenty-five years ago he contributed papers on "A State Medical Service," and "A Ministry of Health" to the *Socialist Review*. Dr. Robb was in practice in Paisley for some years, and was elected to the Paisley Council. Later he accepted the post of medical officer to Messrs. Cadbury's works in Bournville. He was well known in Birmingham as a man of fearless convictions.

Dr. ARTHUR STARKIE PLANT, *M.C.*, of Grimsby, died with tragic suddenness near Brigg, in Lincolnshire, from injuries received in a motor accident. He was born in October, 1889, and studied medicine at the University of Manchester, qualifying M.R.C.S., L.R.C.P. in 1913. During the war he held a temporary commission in the R.A.M.C., and after serving with distinction over-seas was appointed specialist in venereal diseases for the Western Command and the South-Eastern area. Thenceforward he worked wholly in that branch of practice, becoming venereal disease medical officer and pathologist to the Grimsby Corporation, and consulting V.D. medical officer to the Lincoln City and Lindsey County Councils. Dr. Plant's death in the prime of life is deeply regretted by his colleagues in the Grimsby Division of the British Medical Association, which he joined in 1923. "J. M. V." writes: The accident which brought about the untimely death of Arthur Plant will be deplored by many in the north of Lincolnshire. A member of the Grimsby Public Health staff, he specialized in venereal disease and had marked success in the administration of a busy clinic,

which he brought to a very high pitch of efficiency. He had the wider outlook on his work, and was active in propaganda and instruction, and his own strong personality was a powerful factor in the ability with which he handled his specialty. He was a man of few words, but his directness and the matter-of-fact attitude which he employed towards his patients won for him that confidence and respect which is of such vital importance in the class of work to which he devoted himself. His war service was with the Field Artillery, and he was awarded the Military Cross on the Western Front. He was a keen cricketer, and played regularly with the Brocklesby Park team, where his sparkling and stylish batting won him considerable local fame. But apart from his work he will be remembered by the people of Grimsby as the co-founder with his late wife of a Free Animal Clinic under the auspices of the R.S.P.C.A.

We regret to announce the death on August 22nd at the age of 62 of Dr. MARTHA ADAMS, formerly school medical officer for Blackpool. She resigned that post, owing to eye trouble, in 1932, and went to live in Rosetta Park, Belfast. She received her medical education at Queen Margaret College, Glasgow, graduating M.B., Ch.M. of Glasgow University in 1901 and obtaining the Dublin D.P.H. in 1908. Before her appointment at Blackpool she had been medical inspector of school children at Twickenham and in Essex. Dr. Adams became a member of the British Medical Association immediately after graduation, and four years ago joined the Belfast Division.

We regret to record the sudden death of Dr. H. J. MCSHANE on August 17th at his residence, Glen Road, Belfast. Dr. McShane, who was a graduate of Queen's University, Belfast, was only in his thirtieth year, and apparently enjoyed good health. On that day, however, he came home and complained of some minor digestive disturbance, and went to bed about 10 p.m. after a strenuous day's work. When he was called in the morning he was found to have passed away in his sleep, and at the subsequent coroner's inquest evidence was given that coronary thrombosis accounted for his death. Dr. McShane was established in practice in Belfast only a few years, and had rapidly built up for himself a large connexion. He was extremely popular with his patients, and was full of interest in his work and in those who sought his advice ; he was a real friend to all, and none sought his help without also gaining a friend. The tragedy of his death is increased by the fact that he was married only a few months ago, and with his young wife deep sympathy is felt.

We regret to announce the untimely death, at the age of 34, of Mr. HUGH LLEWELLYN REES, F.R.C.S., who was appointed resident surgeon at the War Memorial Hospital, Scunthorpe, Lincolnshire, some two years ago. He had recently been an in-patient at King's College Hospital for a breakdown of health, the result of over-work, and he was found dead in the hospital on August 26th. A promising student at King's, Rees obtained the M.R.C.S. and L.R.C.P. diplomas in 1927, and served as house-surgeon at his old hospital, at the Belgrave Hospital for Children, and at the Radcliffe Infirmary, Oxford ; he had also been assistant medical officer at St. Giles's Hospital, Camberwell. In 1934 he became a Fellow of the Royal College of Surgeons of Edinburgh, and after finishing a term of office as senior house-surgeon at the Portsmouth Hospital he was appointed to the surgical post in Lincolnshire, and became a member of the Scunthorpe Division of the British Medical Association, which he had joined in 1929. He was the only son of Mr. J. Rees, of Narbeth, Pembrokeshire.

Dr. DANIEL W. MCMILLAN, who served as medical officer with the British Forces during the great war and made several big-game expeditions into Africa, has died at his home in Pensacola, Florida, at the age of 58.

We have to record with regret the death of Dr. ARCHIBALD DOUGLAS HAMILTON, who practised for many years at Lacock, near Chippenham, Wilts. He was born in 1877 and studied medicine at University College, Liverpool, and St. Thomas's Hospital, obtaining the M.R.C.S. and L.R.C.P. diplomas in 1901, the M.B.Lond. degree in 1902, and the M.D. in 1905. Before settling in general practice he was house-physician at St. Thomas's, at the Wolverhampton General Hospital, and at the Chester Royal Infirmary. Dr. Hamilton had been medical officer and public vaccinator for the Lacock District and honorary physican to the Melksham Cottage Hospital. He joined the British Medical Association in 1919, and was honorary secretary of the Trowbridge Division from 1926 to 1935, when he retired from practice and went to live at Bratton, near Westbury.

Dr. JULIUS TANDLER, who for twenty-six years had been principal lecturer on anatomy at Vienna University, died in Moscow on August 25th. For some years he had been chief assistant to Dr. Emile Zucker Kandl.

Medico-Legal

WEIL'S DISEASE AGAIN

Many years have passed since the courts decided, in Brintons *v.* Turvey, that a bacillary infection could be an "accident" under the Workmen's Compensation Act. Since then a long list of industrial diseases for which compensation is payable has accumulated, and the latest recruit is Weil's disease. This is now recognized by the courts as a disease which can be contracted in the course of employment, and workmen have already been awarded compensation for its injuries. A miner's wife, the mother of four children, was recently awarded £600 compensation by the judge, sitting as arbitrator, of the Newcastle County Court. Her husband contracted Weil's disease through working underground in water which had been infected by diseased rats. It was also stated that his food had been exposed to infection from rats. The medical witness called by the colliery company said that the latter had not at first admitted that the man died from Weil's disease, but at necropsy the organisms had been found in one of his kidneys. The company was therefore satisfied that death was due to this infection and agreed to the award.

DEATHS FROM SODIUM NITRITE

Sodium nitrite is used in dye factories. It resembles ordinary salt but is highly poisonous. There are few, if any, cases on record of its causing death in this country, but such a case was brought before the coroner at Middlesbrough recently. A chemical worker and his wife and small stepdaughter died soon after eating their Sunday dinner on May 31st, and it was found that the man had brought back a certain amount of sodium nitrite from his work and the family had mistaken it for ordinary table salt. It had been boiled with some potatoes and used on the table. A woman who shared the house with the family gave evidence, and said that she had remarked upon the brown colour of the potatoes as they were boiling. After the meal the wife had been terribly ill, and had told her to prevent the other stepdaughter from getting her dinner out of the oven when she returned from Sunday school. This child is the only survivor of the family. The borough analyst said that he had traced similar cases in other countries and knew of a case in Manchester in which a mother, her family of four, and a lodger had been poisoned but had recovered. The organs of the victims in the present case contained evidence of sodium nitrite. They had eaten rhubarb, which would quickly decompose the nitrite and evolve nitrous oxide.

A verdict of accidental death was returned, and the coroner suggested that manufacturers should warn their workmen that the compound was dangerous and should not be taken away.

Medical News

The annual dinner of the Westminster Hospital Medical School will be held at the Trocadero Restaurant on Saturday, September 26th, at 7.30 p.m., with Mr. A. Tudor Edwards in the chair. On Monday, September 28th, at 8 p.m., Lord Horder will deliver the inaugural address of the medical school at Caxton Hall, Caxton Street, S.W.

The annual dinner of past and present students of St. Mary's Hospital Medical School will take place on Saturday, October 3rd, at Claridge's Hotel, at 7 for 7.30 p.m. The special post-graduate course open to all practitioners without fee will be held on Friday, Saturday, and Sunday, October 2nd, 3rd, and 4th.

The old students' annual dinner of St. Bartholomew's Hospital will be held in the College Hall, Charterhouse Square, on Thursday, October 1st, with Sir Charles Gordon-Watson in the chair.

The annual old students' dinner of St. Thomas's Hospital will be held at the Dorchester Hotel, Park Lane, on Friday, October 2nd, at 7.15 for 7.45 p.m., with Dr. J. R. Harper, C.B.E., in the chair.

A sessional meeting of the Royal Sanitary Institute will be held at Rhyl Town Hall, in conjunction with the Welsh Branch of the Society of Medical Officers of Health, on Friday, September 25th, at 5 p.m., when there will be discussions on "Maternity and Child Welfare," to be opened by Dr. A. E. Williams, and on "The Incidence of Tuberculosis in Cattle-breeding Districts," to be opened by Mr. R. F. Montgomerie.

The sixth session of the International Office for Documentation of Military Medicine and Pharmacy will be held at Geneva from October 12th to 14th. All officers of the health services of armies, navies, and of the air, both active and reserve, are invited to participate.

The German Society of Industrial Accidents will hold a congress at Hamburg under the presidency of Professor zur Verth on September 17th and 18th, when the principal subjects for discussion will be heredity and constitution in relation to insurance, introduced by Aschoff of Freiburg, Weitz of Hamburg, and Siemens of Leyden, and lesions of the meniscus, introduced by Burkle de la Camp of Bochum and Ceelen of Bonn.

The twenty-third Congress of the Alliance of Social Hygiene will be held at Saint Etienne under the presidency of M. Georges Risler, member of the Institut de France, and M. Demozay, president of the Chamber of Commerce of Saint Etienne, from October 2nd to 4th, when discussions will be held on the treatment of social diseases and their prevention and the organization of leisure. Further information can be obtained from Dr. Charles Laurent, 12 Rue des Mutilés du Travail, Saint Etienne.

The first European Congress of "Structive" Surgery will be held in Brussels on October 3rd and 4th under the auspices of the Société Européenne de Chirurgie Structive. The inaugural address will be delivered by Professor J.-L. Faure of Paris. Special prominence will be given to reparatory surgery, cosmetic surgery taking second place. Further particulars may be obtained from Dr. Coelst, 118, Avenue Louise, Brussels.

The King has granted to Dr. Alexander Cruickshank and Dr. Albert Ernest Lorenzen authority to wear the insignia of the Fourth Class of the Order of the Nile, conferred upon them by His late Majesty the King of Egypt in recognition of valuable services rendered by them.

Volume i of the League of Nations report on the problem of nutrition was noticed in a leading article in the *Journal* of August 22nd. Volume ii (price 6d.) and volume iii (price 5s. 6d.) have now been published by Allen & Unwin (League of Nations Publications Department, 40, Museum Street, W.C.1). The former is a report on the physiological bases of nutrition drawn up by the Technical Commission of the Health Committee at its meeting in London last November, revised and amplified at the meeting in Geneva in June of this year. The second volume is a comprehensive survey of nutrition in various countries, with special regard to post-war developments in the field of nutrition.

This year marks the centenary of the foundation of the *Bulletin de l'Académie de Médecine*, the first issue of which was published under the editorship of E. Pariset, L. C. Roche, and J. B. Bousquet on October 15th, 1836.

The issue of *Medizinische Klinik* for August 28th is devoted to the proceedings of the German Orthopaedic Congress.

The issue of *Aesculape* for July is devoted to the painter Vincent van Gogh.

The Royal Society of Medicine of Ghent has resumed the publication of its *Annales et Bulletin* in a new form. Each issue deals with some special subject, to which eminent Belgian and foreign writers will contribute. The January-February number is devoted to scarlet fever. Female sexual hormones, treatment of chronic rheumatism, cardiology, especially angina pectoris, vitamins, and cerebral tumours will be discussed in subsequent issues.

The King has appointed Dr. Charles Norman Griffin to be an Official Member of the Executive Council of the Presidency of Dominica.

The Earl of Harewood has become a vice-president of the Institute of Medical Psychology, representing the British Legion.

On August 10th the French Senate passed a law forbidding the sale of pharmaceutical preparations, preventive or curative, by all except chemists.

The following medical appointments to the Household of the Duke and Duchess of York have been made: Dr. G. F. Still, Sir John Weir, K.C.V.O., Dr. H. Letheby Tidy, and Dr. D. T. Davies to be Physicians in Ordinary; and Sir Lancelot E. Barrington-Ward, K.C.V.O., and Mr. A. E. Porritt to be Surgeons in Ordinary.

The first clinic for the treatment of diabetic children, which has been established at King's College Hospital, Denmark Hill, S.E., was formally opened on Saturday by Major Oscar Guest, M.P.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to **The EDITOR, British Medical Journal, B.M.A. House, Tavistock Square, W.C.1.**

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Financial Secretary and Business Manager, British Medical Association House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS if reprints are required, as proofs are not sent abroad.

All communications with reference to ADVERTISEMENTS, as well as orders for copies of the *Journal*, should be addressed to the Financial Secretary and Business Manager.

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QUERIES AND ANSWERS

Ether Convulsions

"E." writes: I have given ether and seen it given since 1911 without seeing a case of ether convulsions. Has this condition ever been reported following the use of ether alone, open, or closed?

Preventing Perineal Tears

G. F. THOMSON, in answer to "F. C. G." (*Journal*, August 22nd, p. 412), writes: "F. C. G." will have neither ocular nor perineal tears in the future if he will make a half-inch or three-quarter-inch cut in the stretched perineum on each side of the middle line—preferably with a blunt-pointed bistoury.

Sterilizing Syringes

Dr. J. SANDISON CRABBE (Birmingham) writes: In your issue of August 22nd (p. 412) Dr. E. Armstrong asks how to sterilize syringes. He might use the method which Dr. A. E. Wright taught me thirty years ago. He always had a porcelain dish with olive oil in it and a spirit lamp underneath. Generally he had a long thermometer in the oil, which showed the temperature. However, he told me for occasional use a crumb of bread could be put into the oil, and when this became brown the right heat had been attained. He then drew a syringeful of oil into the barrel through the needle and squirted it back into the dish. This, he said, killed all germs and spores. I have used this method for all sorts of injections and have never had any solution go wrong or skin inflammation follow.

Income Tax

Motor Car Expenses

"X. Y." has recently returned from India, and inquires whether "medical men are entitled to deduct certain of the expenses of their motor cars." His banker informs him that he is not so entitled.

*** Where professional profits are concerned such car expenses as are reasonably attributable to that work are allowable—for example, the expense relative to travelling about the area for the purpose of making professional visits. This commonly involves a division of the total cost between professional and private use on an estimated mileage basis. Where salaried appointments are concerned the expense must be not only reasonable but also "necessary." "X. Y." presumably realizes that car expenses which cannot be allocated against some particular source of income are not deductible. For instance, money spent on a car by an officer on leave does not differ essentially from other private expenditure, and must be paid out of income, not deducted in computing income.

Replacement of Car

"T. H." bought a 10-h.p. car in 1928 for £298 and in April of this year replaced it by a 12-h.p. car of the same make costing £282. The old car, which had been depreciated by allowances to £39, was not sold, but was given to a friend.

*** "T. H." can claim depreciation for 1936–7 on £282 at the usual rate, as from the date of purchase, but a common practice is for the depreciation to be calculated on the written-down value as at the last date of making up the professional accounts, and this may already have been agreed in his case. If so, the depreciation allowance for the new car will commence as from 1937–8. He can claim obsolescence allowance from 1937–8 in respect of the excess of the income tax valuation of the car—£39 apparently—over the realization value to him as at the date it was given to his friend.

Purchase of Practice

"Y. Z." purchased a practice on the basis of paying the vendor half the fees for the following three years. He has returned for assessment the moiety he retains for himself.

*** "Y. Z." is the acting proprietor of the practice, and is liable to return for assessment the whole of the profits. The amount payable to the vendor is not an expense of earning on the practice, but is either a capital payment being made in instalments or a division of the profits as between the two persons concerned. In either case "Y. Z." is responsible to the Revenue for the tax on the whole of the profits. Whether he is entitled—for example, by deducting tax from his payments—to any adjustment as between himself and the vendor is perhaps another matter. Prima facie, one should expect a court to hold that the total payments are in their nature payments of capital for the purchase of an asset, that the vendor is not liable to tax thereon, and that the purchaser cannot deduct them as professional expenses, but something might depend on the precise form of the negotiations and of the final transaction.

LETTERS, NOTES, ETC.

Leech in the Trachea

Dr. A. R. HARGREAVES (Church Missionary Society Hospital, Gaza, Palestine) writes: Your correspondent's note (August 1st, p. 268) on a case of a leech in the trachea reminds me of a case I had recently in which the treatment was greatly simplified by the use of a direct-vision laryngoscope. At my first attempt at removal I was not successful. The leech was bobbing up and down like a mechanical jack-in-the-box between the vocal cords, the movements, of course, being synchronous with those of the patient's rapid respiratory movements. After giving the patient a rest and instructions to prolong expiration as long as possible, I introduced the instrument, and with the ready co-operation of my Bedouin patient a fine leech came out in the grip of the laryngeal forceps. It was rather dramatic, thanks to the laryngoscope, through which now many a leech has made a rapid exit. My set of laryngeal mirrors have been quite idle since a kind donor made us his valuable gift four years ago. Those who are liable to be called upon to deal with leeches would be well advised to obtain a pair, one adult's size and one children's size, with the least possible delay. For difficult retronasal cases, where the use of the mirror is imperative, the water from the container of a well-used hubble-bubble pipe, so much used in the East, is very toxic to leeches, and they quickly loose their hold on the mucous membrane. An atomizer is a useful method of applying it. The leech can then be removed either with saline or with the aforementioned nicotine solution. Another case in which the direct-vision laryngoscope gave quick relief was that of a patient, an Arab, who had a prickly-pear spine about three-quarters of an inch long firmly fixed astride his vocal cords. It was again the work of a moment to remove it. How long I should have taken by indirect vision I dare not contemplate.

Holidays for Factory Girls

We have received the following appeal, signed by the Duchess of Norfolk, the Countess of Sandwich, the Bishop of London, the Chief Rabbi, and Lady Lock, on behalf of the Factory Girls' Holiday Fund.

"Will you allow us to make a very urgent appeal to your readers for the Factory Girls' Country Holiday Fund? Throughout the year the poorest working women and girls are sent away, but the majority are compelled to take their short holiday, usually a week, sometimes only a week-end, in July, August, and September. Many are mere children of 14 and 15. Most of them save up small sums weekly for months before, but they cannot contribute much towards the cost as the majority are helping to keep younger brothers and sisters. The committee is hard pressed for funds to meet the heavy demands made at the holiday season. Hundreds of women and girls are hoping to go away now, and only those who live and work among them can realize what a bitter disappointment it will be if we have to refuse to send any of them for lack of funds. Their home conditions are far from good, and they live and work in the most crowded and airless districts of our great city. We feel sure that the generous public will come to their aid and enable us to provide the change and rest they so sorely need. Gifts will be thankfully received and acknowledged by the honorary treasurer, Mrs. Slater, or by Miss Mary Canney, 75, Lamb's Conduit Street, London, W.C.1.

Disclaimer

Dr. ELLIS STUNGO (London, W.1) writes: I very much regret the unfortunate publicity which has been given to my work by the lay press recently, and I ask the courtesy of your columns to disclaim any responsibility in the matter.

Vacancies

Notifications of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 48, 49, 50, 51, 52, 53, 54, 55, and 58 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 56 and 57.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 159.